

In This Issue—Some Facts Dealers Should Know

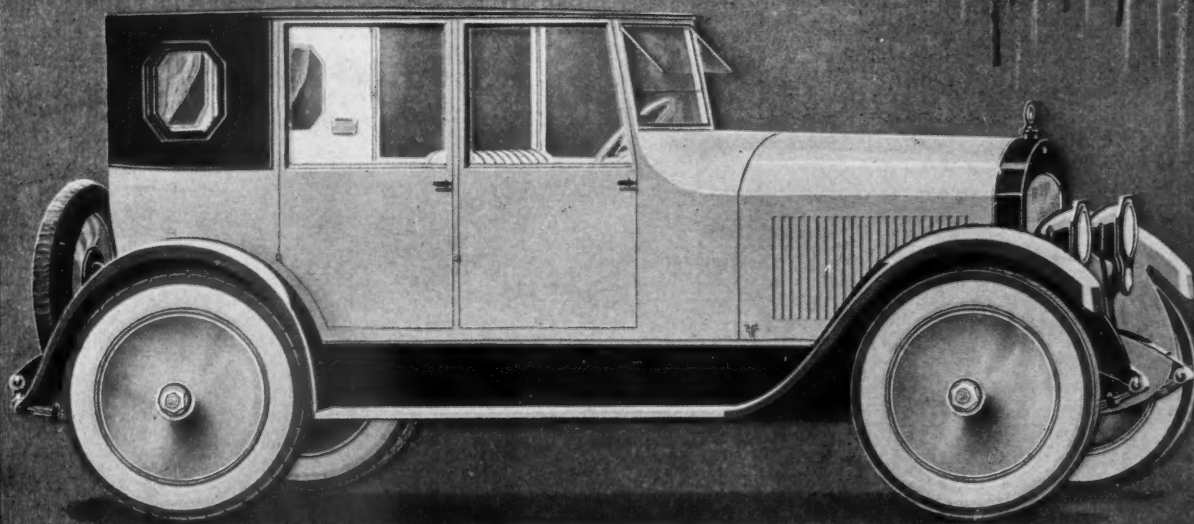
MOTOR AGE

Volume XXXVIII
Number 6

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Five Dollars a Year

THERE'S A TOUCH OF TOMORROW IN ALL COLE DOES TODAY



Sportsedan

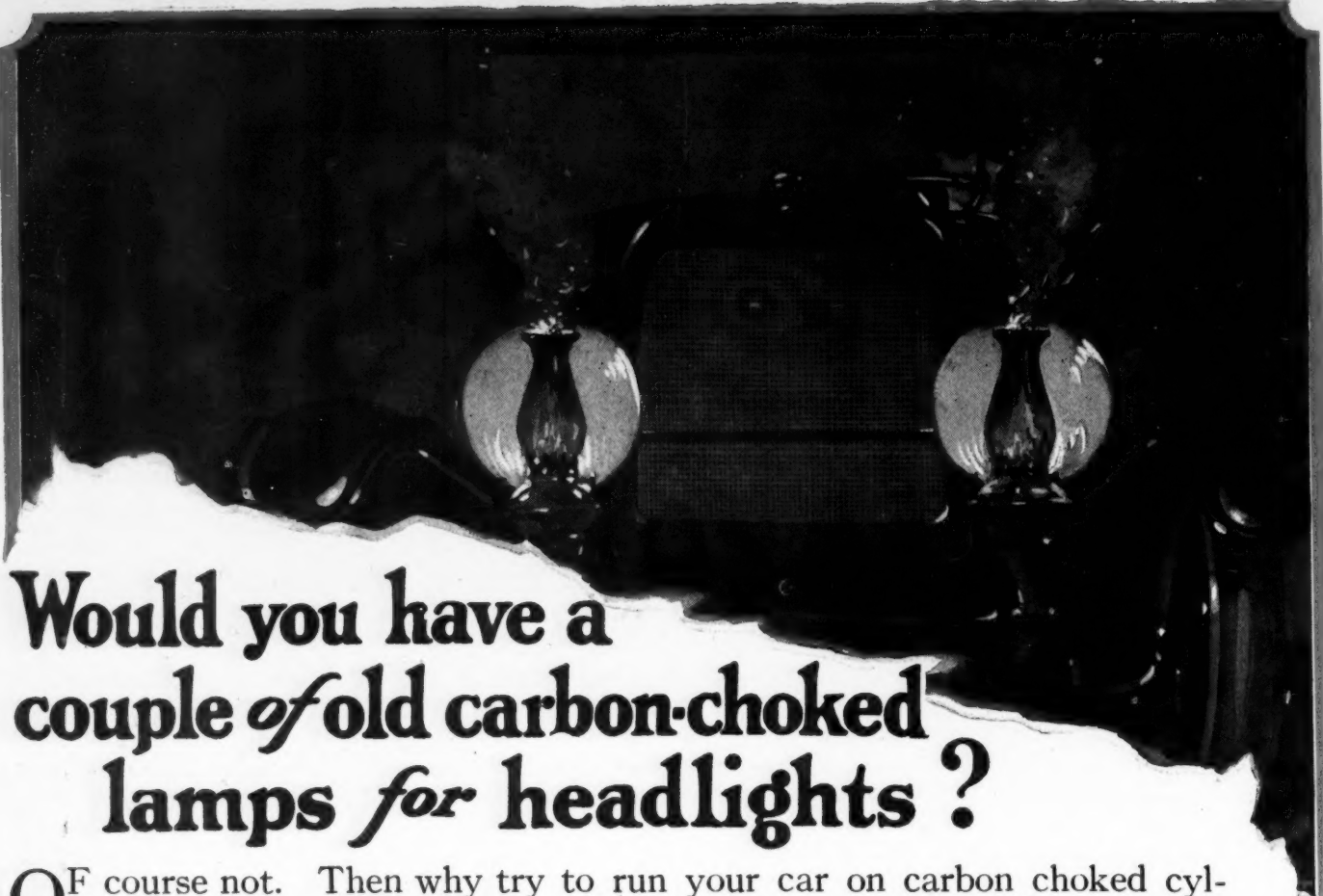
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Cole Aero-EIGHT under all conditions
of travel and its uniform efficiency of
operation under all circumstances enables

Cole dealers to place their personal
guarantee upon it, knowing that it will
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may make for it.

COLE MOTOR CAR COMPANY, INDIANAPOLIS, U. S. A.
Creators of Advanced Motor Cars



Would you have a couple of old carbon-choked lamps for headlights?

Of course not. Then why try to run your car on carbon choked cylinders? You, yourself, can easily clean the carbon from the cylinders—in ten minutes—without even soiling your hands—and the cost is trifling.

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We offer you **JOHNSON'S CAR SAVERS**—there's one for every purpose. No experience is required for their use—they can all be applied by the average motorist with perfect results.



Johnson's Black-Lac—the perfect top dressing.

Johnson's Cleaner—removes spots, stains, tar, alkali, etc.

Johnson's Prepared Wax—for polishing body, hood and fenders.

Johnson's Radiator Cement—in liquid form and easy to use.

Johnson's Stop Squeak Oil—a wonderful spring lubricant.

Johnson's Auto-Lak—a splendid one coat body varnish.

Insist upon your dealer supplying you with **JOHNSON'S CAR SAVERS**. Don't stock or use unknown substitutes. Write for our booklet on Keeping Cars Young—it's free.

S. C. JOHNSON & SON, Racine, Wisconsin
Canadian Factory, Brantford, Ontario

MOTOR AGE

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"NORMA" PRECISION BALL BEARINGS

(PATENTED)

Never yet has anyone arranged a successful compromise between price and quality. Manufacturers with an established reputation to maintain, never attempt it. Today—as for years past—"NORMA" Bearings are the accepted standards in the magnetos and lighting generators which dominate their fields by virtue of sustained high performance. It is a question of quality, pure and simple.

See That Your
Electrical Apparatus
is "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

Anable Avenue
Long Island City
New York



Ball, Roller, Thrust and Combination Bearings

POPPET VALVES FOR AUTO, TRUCK, TRACTOR, AIRPLANE AND STATIONARY ENGINES



Do you know that the *poppet valves* of your auto or truck engine are subject to pit, warp, leak or burn—that the *seat* is subject to pit, leak or burn? You probably know that the valves can be replaced—but do you know that the seats are usually cut in the cylinder block and cannot be replaced?

Do you know what it costs to open up your motor and regrind the valves—what it cost to install new valves—what it costs to install a new engine block, a seat of which has been ruined either by recutting or burning?

Do you know whether your valves are holding compression? Do you know that you can't tell by the "feel?" How then? Ask us. Do you know whether the gallop of your engine is caused by uneven compression; that stalling is caused by valve leakage; that the lower the compression the richer the mixture must be.

Do you know that more than 50% of the valves used in American cars today have cast iron heads; that this type of valve in addition to being subject to pit, warp, leak and also subject to regrinding is liable to crack.

Do you know that the carbon steel valve head (pioneer construction) is subject to the four cardinal failings, that tungsten alloy heads (if they are high in tungsten) are not subject to pit, but are to burn—that they hold no virtue which protects the valve seat from erosion or destruction?

Do you know that the chromium alloy head, maintaining its hardness under heat conditions, suffers less from the effects of carbon accumulations, while the soft seat suffers relatively more?

Do you know what kind of valves your motor is equipped with?

Do you know that FLEXEDGE valves will not pit, warp, leak nor crack, nor need regrinding; that they protect the companion seat against destruction?

The creeping action of the FLEXEDGE valve face is the "reason."

FLEXEDGE is backed by an absolute satisfactory guarantee—AND THAT GOES.

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MOTOR AGE

Are You As a Dealer Awake To These Conditions?

THE time is rapidly approaching when automobiles will be sold from the back door, and the dealer who has planned wisely, looked ahead a few years and now is organizing for that time is pretty sure to be one of the preferred dealers when the "weeding-out" process begins. All of which simply means that the dealer who now is giving serious thought to his service will make money and endure to the end and be doing business when his fellow dealer who thought he could get by with slipshod methods has long ago been forced into some other enterprise.

We are on the threshold of a period of intensive merchandising and sooner or later every dealer will have to hustle if he is going to keep on doing business.

It will be interesting to note the part service is going to play in this era. Certainly, many things have

to be changed in the methods now in vogue. Service is what keeps the car or truck sold and the better the service the dealer can render customers, the better they will like it. And they will come back for more. This does not mean that the dealers are going to give something away for nothing. It simply means they will have service co-ordinated with the rest of their business. If they do not make a business of it, someone else will.

Today there are many service men, men who not only know how to keep automotive apparatus in shape, but who have sufficient business ability to start service stations of their own. At the present time many of these separate institutions are classed as outlaws or independents and, perhaps, are not serious contenders in automotive service work so far as the dealer is concerned. But, they may become an important factor

By B. M. IKERT

DO YOU do all the service work on every car that you have sold? Do you think that in the future you will do all the service work on every piece of automotive apparatus that you sell?

Probably, every dealer of whom these questions are asked would answer about like this:

"No, there's so-and-so who bought a car last year and has been here but twice. I know he must be going to Blank's down on the corner. I've seen his car there at times. And I know if ever I sell Mr. Jones over here a car, he'll never come in for service. He simply will buy the car I sell because he likes it. So far as service is concerned, he'll go to Blank's, because he'll think we might rob him."

And so the conservation might go on.

To be frank every dealer certainly knows he is not getting all the service work he might do. There are exceptions, to be sure, especially in smaller communities. But, in the larger centers, dealers who ought to be getting service work, do not get it. Rather, the owners of cars which these dealers have sold seek other places to have work done. Why?

Simply because the dealer who sold the cars is not organized properly. And just as long as he remains disorganized,

he runs the danger of never selling a customer twice and the ultimate danger of being wiped out altogether when we

reach the period of more intensive merchandising.

This era of intensive selling means not only the selling of the product, but the selling of the service that must go with it.

There are altogether too many car owners, who, when asked about service, will tell you they bought their cars from so-and-so, but that they go over to Blank's when they want work done, because he knows all about cars and keeps his promises.

It is this fellow Blank who is stirring up conditions mentioned in the introductory note accompanying this article. Let's stop for a moment and first see who this fellow Blank is.

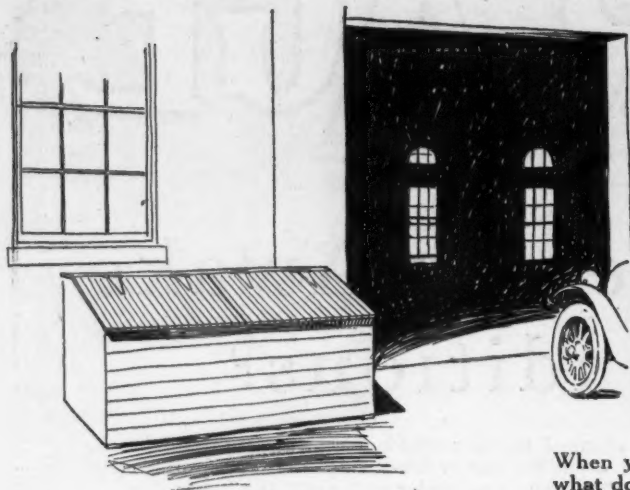
We find that at one time he was employed as service manager for a dealer. He has studied conditions, met customers, knows the mechanical end of the business and has ordinary business sense. He finds the dealer for whom he works slow to appreciate up-to-date methods and unwilling to build up the standard of service.

The result is that one fine day Blank who has become well acquainted with the dealer's customers, and whose good-will he has enjoyed for some time, leaves his



One of the things you can do to lessen complaints is to see that none of your men do as this mechanic is doing—getting into the owner's car clad in grimy overalls.

Make Your Entrance Inviting and Reflect Orderliness of Your Service



employer. He starts a service station and the natural thing happens. The people who own cars that this dealer has sold them have learned to like Blank's methods. He never disappointed them, always gave service with a smile, did the work well, and so they just naturally drive their cars over to Blank's service station, although they still might be good friends of the dealer who sold them the cars.

These owners tell their friends of the excellent service they get at Blank's and pretty soon Blank is doing an excellent business. Right now there is but one thing standing in the way of complete success of individuals like Blank. That is the question of discount on parts.

The motor car factories hold that men like Blank are outlaws and not entitled to discounts. It is not the purpose of this article to say what our factories should do, but the thought arises whether a factory is doing the right thing in refusing Blank a discount on parts when he is rendering excellent service on the cars built in that factory.

The next big thought which comes to our mind is: "What of the dealer's service? Why is he not getting the work Blank has taken from him?" Perhaps, if some of our dealers would exchange positions with their customers they would appreciate the reason why some of their customers go to Blank's.

As a general thing repair work in the dealer's service station is pretty well carried out. When traced down it generally will be found that disappointment on the part of a customer comes from the fact that he or she did not get one or more of the things we are accustomed



When you are in a strange town and trying to find a good place to eat, what do you look for? A clean, neat appearing restaurant. You judge the food therein will be tempting and well prepared. What of the service stations? Look at the entrance above. Just a little effort making a box as shown in the sketch would improve the looks 100 per cent and add confidence in the car owners mind as to the character of work done inside.

to have in the ordinary walks of life.

Take the illustration on the preceding page. This is typical and something which actually happened. A woman drove to a dealer's service station for the purpose of having the engine checked up and tuned. Instead of a tester in a clean linen suit or duster taking the car out for a trial, the foreman told a mechanic to "hop in that job and see how she's hitting." The man to whom he addressed his remarks had been working on the floor, and do you wonder the woman was horrified when he adroitly placed himself in the front seat and took the car out. Yet this same man would hesitate to sit down in a parlor chair in his working clothes which costs far less than a motor car. The dealer's service wasn't organized.

Blank has learned this long ago. Let's see what he does in a case of this kind. He has a man whose sole job it is to meet people. He is not one of the mechanics, although he has a good conception of what is good and what is poor work. He knows the car and can shoot trouble. When it comes to taking a car out this man is dressed for it. Should he by chance be working on a car that necessitates his staying with the job and the assistant is called upon to take the car out the latter, while dressed in mechanic's togs, does not get the upholstery or the steering wheel soiled. Let's see why.

First, he washes his hands and slips off his overalls. Still, the clothes he wears underneath the overalls might be somewhat oil-soaked so he takes from a

drawer in a cabinet a piece of light canvas of such dimensions that it can be placed in the front seat and over the back of the seat. Next he slips on a pair of canvas gloves that never are used for doing dirty work, and in this condition he takes the car out. A man with a Palm Beach suit or a woman with the daintiest frock can drive the car immediately after one of Blank's testers has taken the car out without running the risk of soiled clothes or hands.

Then there is the item of broken promises—probably the most prolific source of all trouble between dealer and customer. It is vastly better to tell a customer that time did not permit doing all the things he signed for than to let the cus-



Take a lesson from our modern gasoline filling stations. Each one is trying to outdo the other in appearance and you seek more often the one that looks most inviting, although architecturally it may not be as good as others.

tomer drive out only to find out after a short time that certain repairs or adjustments have not been made. To be sure, service managers cannot watch every job, but certainly methods can be adopted whereby some responsible man can check over the work listed on the job ticket and make sure that all has been done or not.

A customer will not feel nearly so resentful if you tell him of a job that has not been finished than if you leave it to him to find out. That's another reason why customers go to Blank's. They know that when Blank says the car is ready, it is ready.

In getting about the country one is impressed with the lamentable fact that service stations must be made more attractive. Lavish surroundings are not essential, but certainly a man likes to drive into a place that is neat and clean. Look at the picture on the opposite page.

The Farce of Service

How Millions of Dollars Worth of Repair Business Is Being Steered Away From Some Dealers' Service Stations

"YES SIR! If you have any trouble at all, drive right in. We'll take care of you; that's part of our service."

Thus shouts the contented salesman as the new owner allows his new engine to race and nervously tries to shift gears, only to make them sound like a concrete mixer. The salesman's promise sounds reasonable, and who knows, perhaps, he would like to extend the new owner every courtesy possible. But one thing prevents him, namely: the conviction that his boss, the dealer, hasn't a very clear-cut conception of the similarity between good business and good service. So the salesman has come to extend the service guarantee in a purely mechanical manner. He says, "Come back any time; but what does he mean?"

Here is the same car owner limping around to the service station one week after his check has gone through for collection. There is a knock in the engine—something which he neither paid for nor wants.

Surly Regard for Complaints

"We gave you that with the car," one of the floor men banters, while the mechanics look on as though the owner had violated some rule of the shop by daring to register a complaint.

"All joking aside," urges the owner, a man who gets paid for what he accomplishes and not by how much time he wastes, "I can take care of squeaks and rattles and the usual adjustments, but this is something I've had to contend with from the time I drove the machine out of here."

"Sure," the foreman comments, "your spark is probably set a little too far in advance. We'll fix it up for you, but we

There is too much of this kind of entrance ways. If you must have broken parts, boxes or crates around, at least make a large wooden box like the one in the sketch. This will make it far more attractive. Sailing vessels are roughly built when it comes comparing them with a fine steamer, but generally you will find they are orderly and clean about the deck. Hence, the name "shipshape." Make sure your service station, especially that part the customer sees, is shipshape.

Take a lesson from our modern filling stations. Each one tries to outdo the others in appearance. They have not one-half the things to sell which the dealer has, yet many dealers are satisfied with a converted livery stable as a service station.

Look around your service station and see where these suggestions apply to you and correct them.

can't quite see our way clear to-day. Got a few cases to drop and a rear to go over. Come in—well, say to-morrow. Chances are we'll be filled up again, but come around anyway."

This scene, while greatly condensed in the telling, really consumed forty-five valuable minutes. And during this time not one stroke of work was done by anyone in the shop.

Putting the Work Off

"Procrastination!" the owner growls to himself, when he has once more repaired to the street. "They'll tell me the same thing to-morrow. Why don't they plan their work in advance and make a definite appointment? Or better still, why didn't they spend some of that valuable time trying to find out whether the trouble could be remedied by taking up on the push rods."

And just as he anticipates, "to-morrow" brings the same sort of stalling on the part of the service station. He is black-listed at once as a "kicker." Accordingly, in line with the dealer's policy of stalling, the owner is "consoled" by having someone in the shop set back the spark.

"Try this," the car owner is told.

He does.

Yet the knock remains. When he goes back the third time the foreman spends an hour telling him what a big job it is to discover the trouble and that they will need at least a day to do it in. It is arranged that the work shall be done a certain day the following week.

The appointed day comes; a few more hours are wasted. Five o'clock comes. The car is not ready. Noon of the next day comes. Still the car is not ready.

Five o'clock rolls around again. And the car is almost ready to run!

But knockless? Never!

This, be it said, is not an exaggerated case of the average dealer's service inefficiency. We might tell of a dozen similar instances wherein the farce of service is clearly demonstrated. It is just such chronic tactics as these which are putting the dealers far behind the independent repair men in the matter of looking after the needs of car owners. Ten dollars is an absurdly low figure to represent the average car owner's annual repair item, but multiplying this by the 6,000,000 or more cars in the country and it becomes apparent that the dealers are losing a vast amount of business from their original customers. The business is going to the independent repair concerns who must cater to customers in order to keep in business. Every cent of this business would go into the dealer's cash drawers if only good business principles were substituted for procrastination.

Some Owners Unreasonable

These remarks are not made with any desire to steer trade away from the dealer, but mainly to show him why his trade is actually being steered away. Also to bring to his attention the enormity of his annual loss—a loss which is quite necessary.

There are unreasonable car owners, of course, whose idea of service is to have the dealer mend inner tubes and clean carbon free of charge, but eliminating these exceptions there is no reason why dealers should not be able to hold on to at least fifty per cent of their original customers. This would be possible by introducing a new system in service stations—a system of co-operation.

"A lie a day keeps business away," seems to take the place of the "Home Sweet Home" sign in the average dealer's service station. We know of three sales which the agent for a certain make of car lost merely because the prospectives were warned against the poor service which went with the car. Three lost sales in a small territory is a matter of no little concern. Service is a matter entirely in the hands of the dealer. If he is not foresighted enough to realize that neglect of his customers means shearing his car business of its possibilities, he is not the right man to handle the manufacturer's goods. Unfortunately, bad service has become a universal evil and not a characteristic of an occasional dealer. The three prospectives mentioned above found that the word "service" was as strangely interpreted in the homes of the cars they bought as in the home of the car they didn't buy. And the consequence is, each and every one of them are giving their business to independent repair men.

This is good business, too. A service station may be obliged to adjust a few carbureters, chase a few squeaks, tinker with the wiring, or—in rare cases—replace a defective part; but the time soon comes when the car owner will be

(Concluded on page 51)

Big Returns From a Small Investment By PROGRESSIVE METHODS



One of the places of business operated by J. Lawrence Hill, Rochester, N. Y., who can tell you in a moment where his business stands at any time

THE success attained by J. Lawrence Hill, of Rochester, N. Y., who gave up a position as designer and superintendent of a well-known high-grade automobile manufacturing company, that he might launch a garage and automobile repairing business of his own with a limited amount of capital, substantiated his belief that if a man would but employ real progressive methods in the garage business, big returns could be had from a small investment.

With this idea in mind he set to work to study the problem from every angle, listing the failures and the successful ones. The result was he copied a few ideas of the money-makers and with the injection of a few original ideas of his own he started out.

No Tipping Allowed

He hired a large empty brick building in the residential section of Rochester in September, 1912, a building large enough to accommodate 225 cars. He managed the garage, of course, and did all the repairing and washing. Being a firm believer in publicity, he adopted as a business slogan the following: "Take It To Hill's," "Honest Repairs," and "Just Prices."

Within a short time his personal attention to customers together with his personal work and square deal methods resulted in his work enlarging immensely and the growth of the staff of employees from one porter to sixteen men.

No tipping employees is permitted by Mr. Hill, a large sign being displayed to warn customers, the majority of whom were notified by a polite letter when the rule went into effect that on and after such a date, tipping of employees would not be tolerated. The persistence of one

customer led to his being told openly to take his car and trade elsewhere.

"This is one evil I believe has been and is the cause of poor service in the garage and repair shop," said Mr. Hill, speaking of the rule. "It is not encouraged by the proprietor directly but indirectly he does encourage it when he is afraid to offend a good customer who persists in tipping an employee. Every customer should be given one kind of service—the best—and there should be no discrimination between the clerk with the small car and the wealthy man with the \$5,000 car and a \$50,000 income. Tipping can be largely avoided in small

The business is divided into five departments, each having a manager. Charts are plotted to show the performance of each division and any decrease in business is remedied at once

garages and others by preventing personal contact between the workmen and car owner. A head of a department accepting a tip when he knows it is against the rules should be discharged."

It is so arranged that the business of the company is handled by five department heads. These departments include electrical, accessory, repair shop, garage and battery. Each department is conducted in every instance as an individual business. Each is charged with its proportion of the rent, light, heat, power, labor, material, insurance and overhead. The head of each department is responsible for the work done therein. The balance sheets supplied by the book-keeping department monthly plainly indicate the results of the quarter, semi-annual and yearly business.

Record of Each Department

The use of charts to show the performances of each department is an original idea of Mr. Hill's. The plotting of curves on these charts indicate the past and present records of each department, the gross, net, stock and percentage of profits. By this aid it is a simple matter to keep track of the progress made by each. The falling off of a curve usually



The service station of J. Lawrence Hill, wherein there is no discrimination between the clerk with a small car and the owner of a \$5000 car

results in an investigation and sometimes the department head is given a suggestion or two which improve conditions. Conferences between the heads and officers at which problems that arise from time to time are threshed out are encouraged and often produce results. A similar plan is in vogue between department heads and employees.

The electrical department, which includes everything electrical with the exception of storage batteries, contains the official service station for the Gray & Davis and Westinghouse starting and lighting systems and Klaxon horns, also the Bosch and Splittdorf magnetos. The workmen are factory trained, and while they specialize on the equipment named, they are experts on general electrical construction and repairs. The apparatus equipment of the shop is unusually efficient.

Parts Accurately Priced

Each time a piece of apparatus is received for repair, for instance a magneto, the foreman of the repair shop, floorman, or department head utilizes a magneto repair card. Each card is numbered serially and consists of white paper

about 6 by 4 in., also an orange card of like size. The white card is perforated, and the customer receives the lower section as a receipt. The data relating to the magneto is written on the upper part, when promised, etc., and goes to the bookkeeping department. The orange card, or carbon copy, contains the O. K. of the department head, by whom received and the instructions. The reverse side of the card is used for listing the material used on the job, and each part must bear the catalogue part number. This is done to insure that the handling and pricing is done by one familiar with changes in costs, etc.

Requisitions Necessary

The head of the accessory department is virtually the purchasing agent, and, with the exception of tools, battery supplies, fuel and oils, all supplies, parts and equipment are handled by this department, which is accessible to its head and assistant only. Without a requisition properly filled out it is impossible for one to obtain even a copper pin. These requisitions indicate the use intended, and the pin, or whatever the material may be, is charged to the depart-

ment in question. For instance, a customer requires a brush for a generator and pays cash, a record is made and the cash goes to the cash department of the office before the brush is delivered. Virtually, the same method is carried out with all material. Supplies of all kinds, sold and charged, must agree with the office records. In this manner leaks are avoided.

As indicated an extensive line of small parts are carried for the many types of magnetos, generators and motors. Each drawer, bin and container has a sample part, to which is attached a round metal rimmed tag, bearing on one side the maker's number and the name of the part. The price and catalogued part number is on the reverse side. As the cost fluctuates the prices are revised.

The conventional methods in repair shops have been adopted in this instance. Under the head of garage is included, towing of cars, storage, changing of tires, vulcanizing, fuel, oils and greases. Customers are afforded a twenty-four hour service, the vulcanizing being done by the night floormen.

One of the most highly developed departments is that pertaining to batteries. Starting, lighting and vehicle batteries are charged, rebuilt and repaired, as one section of the garage is given over to the care of electric passenger vehicles.

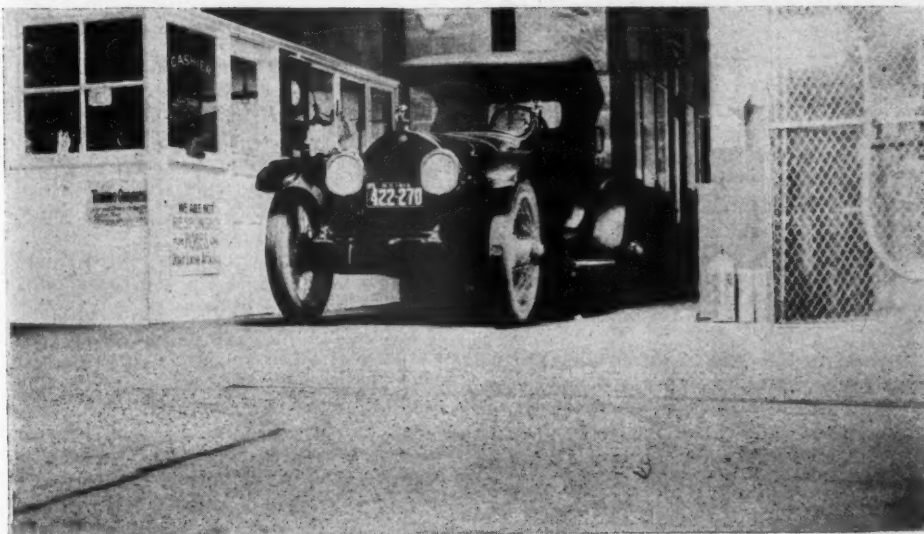
Testing Faulty Batteries

The battery department employs five men and occupies a section of the basement. The stock sheet shows more than \$5,000 worth of parts on hand, which may give some idea of the volume of business transacted in this department.

Among the many time and labor saving devices in use is a testing board designed and built by Mr. Hill, which permits, among other things, the testing of the discharge rate of a suspected faulty battery, the resistance being variable to meet the individual requirements of the starting system.

The company carries a large number of batteries and its rental service provides approximately 400 batteries. Mr. Hill has made the keeping of these in serviceable condition and available for instant use possible by what he calls his freshening racks, which are located in a separate room. Above the top shelf is a conduit with a number of type C condulets, having a two-hole porcelain cover with a nipple attachment for an incandescent lamp. Leading from each outlet are two large insulated cables, plus and minus, and attached to each is a Mueller clip or terminal. Each outlet is capable of caring for fourteen three-cell batteries or the equivalent of sixteen lines.

Carbon filament lamps are utilized for resistance, the usual rate being one ampere for the freshening charge. The charging current is 110 volts, and the wiring is in multiple series. It is needless to observe if the cells are "gassing" to know that they are being charged, as the lamp, if lighted, indicates this fact. The lamp will fail to burn when either terminal is disconnected as the circuit is then broken.



Above, the electrical repair department, and below, a car coming out of the service department. Note the cashier's office close by

Requisites of a Paint Department

WHAT TO HAVE AND WHY—Good Ventilation and Air Free From Dust Are of Prime Importance Together With Selection of Material

EVERY ambitious business man strives to better the service which he gives his customers as the only sure and safe way of increasing his profits.

There is one item of service which nine out of ten garages neglect and perhaps through no fault of their own, and that is service on paint and varnish. Every car owner seeks it, or can be made to see the value of it, and there is no cleaner or more profitable branch of the service field than just this sort of service on paint and varnish. Garage men approached on the subject show great eagerness to get into it, but believe that it cannot be well done with their facilities, even if they had the ability or the man to do the work, or, having the facilities, lack the man or the ability and know of no place where the training or the workman can be obtained.

There is a scarcity of automobile painters throughout the entire country. Factories as well as job shops are constantly in search of the good ones. Paint shops are crowded. And with some seven and a half million motor vehicles on the road it is time that steps were taken to meet the ever increasing demands of the car owners for the proper care of their paint and varnish demands.

Requires No Special Skill

Right now the average price for painting a seven-passenger car in Chicago's best shops is around \$250—a limousine \$350 to \$400. This is for a "burn-off" job,—that is, the old paint is removed and fresh is applied. Now, if the very best materials are used, and the maximum number of coats are applied, in neither of the above cases will the cost and materials exceed \$10. Of course, these are Chicago prices, but there is absolutely no reason why you cannot do the same grade of work wherever you are, in small town or city, if you will prepare yourself for it in the same way that you rigged up and prepared yourself to take care of the other service needs of your customers. There is nothing complicated or difficult about it. It is work that has been reduced to a science and can be handled as such.

Automobile painting requires no more skill than the grinding of a valve or scraping of a bearing, and if a man can learn the theory and knack of the one, he is certainly able to do likewise with the other.

There are but three classes of materials and operations, and when these are once learned any sort of work can be handled. It is not like repairing cars, for here the requirements vary, and a new make of car or part often gives one

BY G. K. FRANKLIN*

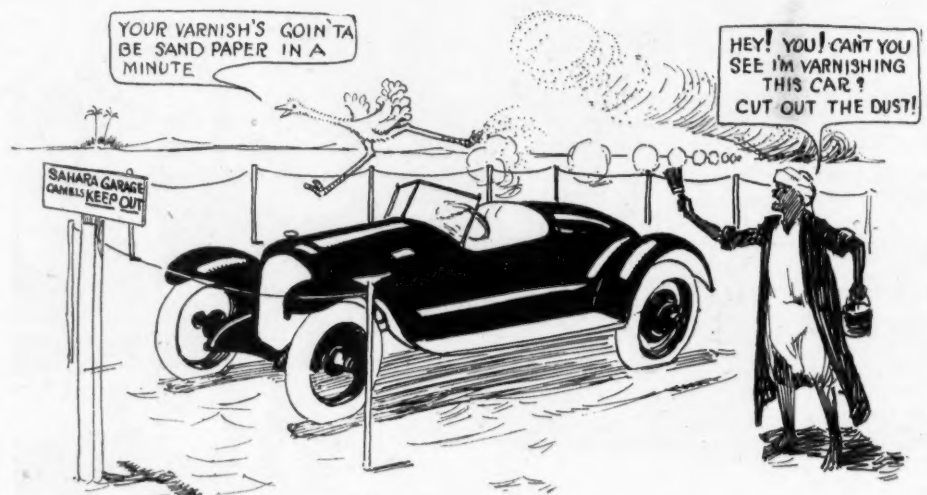
new problems. And one of its features is that the other fellow can't watch you at your work and get your methods, for the success of the work depends largely upon the use of proper materials, and the man who is going to engage in the business and buy his materials from the corner paint store is doomed to failure right at the start. The proper selection of materials is something which even automobile painters often know nothing whatever about, as they have worked for others, and were forced to use whatever materials were handed them.

Thus we see that there is a means at hand whereby the proper instruction can be had to fit a man for giving this sort of service. The old idea, regarding its impracticability are exploded. Only the

he could do better if he started such a scheme.

In considering the addition of a paint department, the first question which a garage owner asks himself is,—“What would I have to do to my place here in order to rig it up for doing first class work?” This question cannot be answered in a way which will suit all cases, as garages vary in their lay-outs, but the requirements are so simple that once known anyone can size up his own shop and then decide the details for himself.

Automobile painting can be divided into two stages. The first, preparing the work for the finishing coat of varnish, and the second, applying the finishing coat of varnish. For the first stage of work, all that is required is the ordinary garage floor with the main doors vesti-



Protected from sand, good work could be done on the Sahara Desert

other day, a garage man in a small Illinois town said that he hadn't taken up the service end on paint and varnish because he thought that it was impossible to do good work in a small town. Location has nothing whatever to do with it. Protected from the sand, good work could be done in the middle of the Sahara Desert. There is nothing difficult or mysterious about it, once understood, and it is only the uninitiated who believe it to be so.

An automobile paint shop foreman said last week that the country cars were suffering so for lack of proper care of their paint and varnish, that he was sorely tempted to take his car and kit and make for the rural districts. There to become an itinerant automobile painter, doing the work in the owner's garage or barn. This man is getting big wages, but he said that he thought that

buled, or at least the work protected in such a way that it will be free from any onslaughts of dust or dirt. Nearly all of the first coats of materials are either sanded or rubbed down to a smooth finish after application, so this work with the abrasive will remove any light dust which adheres to the work, but in applying the last coat or the finishing varnish, no dust or dirt can be permitted as this coat is not rubbed afterwards. Hence, for applying this finishing coat it is well for the best work to have a corner of a room partitioned off so that it can be closed off from the rest of the floor and thus made dust-proof. This will insure clean work and at the same time will not take up any floor space as it can always be used for storage whether a car is being varnished in it or not.

Painting is not dirty work, and aside from the cleaning or removing of paint

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there is nothing connected with it that should soil the floor; so for advertising purposes some take the cars into their showrooms after painting, or even do some of the work in the window as there is nothing like it for the purpose of drawing the attention of the crowds.

Good ventilation is a necessity—this does not mean the installation of a ventilating system, but rather that the car be in clean fresh air during the drying of the paint coats, so that there will be an abundance of oxygen present. A paint which is made up with a volatile vehicle like turpentine, dries when applied because of the evaporation of this vehicle—leaving the pigment spread out in a film. A paint which is made up with a drying-oil for a vehicle, dries because of the oxidation of this oil, and most of the coats of materials used in automobile painting dry by oxidation, hence the need of adequate ventilation.

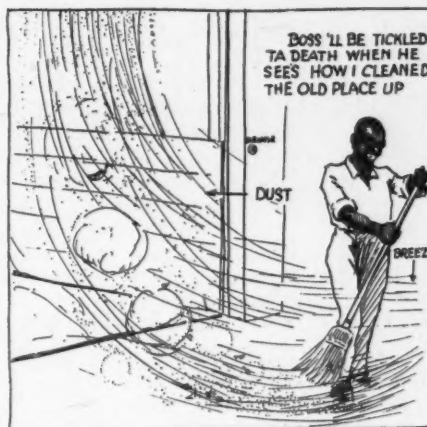
This does not have to be any better than you would provide for your own working conditions. If the air in a room is satisfactory to a workman it certainly contains enough oxygen to take care of the oxidation of the paint or varnish, but where the air is objectionable because of engine fumes and dust, certainly it is objectionable to good work in painting. If the air in a room feels "close", it is because it is lacking in oxygen, and just as it is lacking for breathing, it is lacking for drying. Let your nose be the judge of ventilation—give the work the same kind of air that you would provide for yourself, and you will have an infallible gage.

Top Floor Best for Painting

In buildings having more than one story, the top one is generally selected for painting work as it affords the best light and air, but it can be readily made undesirable if the elevator shafts and stairways are not enclosed as the accumulation of engine gases on the lower floors will rise thereby and pollute the air.

Sunlight bleaches color and hence its direct rays should be avoided by choosing the proper exposure, or shades should be provided at the windows so that the work can be protected when necessary. The room used for supplying the finishing varnish is better off without shades, and should be out of the path of the sun wherever possible. Every surplus article of furniture, etc., should be excluded from this room so that anything which will collect dust may be eliminated. The walls and ceiling should be so prepared that they can be washed. In fact, the room should be so bare that it can be hosed out at any time when necessary.

If facing sun exposure, shades may be used, but they should be kept clean so that no dust will fly out from them when lowered. Daylight is not absolutely essential. It is the cheapest method of lighting but is not required if it cannot conveniently be had. The selecting of colors or matching of them should quite properly be done in the daylight, but their application can be performed in



In buildings having more than one story, the top floor is generally selected for painting work as it affords the best light and air, but it can readily be made undesirable if the elevator shafts and stairways are not enclosed

artificial light if desired. The main thing is to have enough light, whether daylight or artificial, so that the workmen can see what he is doing. Floor lights can be used to excellent advantage. Daylight hastens the drying action of paint to a small degree, but not enough so to be of interest.

Thus we see that cleanliness is essential while daylight is not. And now we come to the matter of temperature and heating. In order to do good work, the automobile painter learns that he must match the different coats of material for elasticity. That is, he must apply a coat of material next to the metal which will expand and contract with it throughout all changes of temperature; and likewise for all the other coats. Upon consideration it becomes apparent that this must be so, because otherwise the paint would crack or flake off. The temperature of the material being painted, the paint and the air must be so nearly alike that unequal rates of contraction and expansion will not weaken the film of paint.

In other words, if an automobile body which has stood in a room having a temperature of 50 deg. is run into a room heated to 80 deg. and a coat of varnish is applied to it which has been standing on the floor of the second room and possesses a temperature of 75 deg., we have one material, the metal of the body, which is going to warm up 30 deg. and another, the varnish, 5 deg.; in doing so, they will both expand, but unequally,

and one can never feel certain of the permanency of such work.

For good work, the body should be of the same temperature as the room and the material should not be kept on the floor where it is the coldest, nor near the ceiling, where it is the warmest, but on a shelf about midway up on the wall, where it will have the average temperature of the room.

Steam or hot water are by all means the most desirable means of heating a room, with the radiators or pipes along the wall near the floor. Radiators are perhaps the more desirable as they can be used to regulate the heat by using as many of them as required, while all of the pipes must be used at one time, unless some other form of control is installed. A thermostat is a worry saver—not expensive and once installed will take all causes of worry over the proper degree of heat from the painter's mind.

The hot air system is not quite so desirable on account of the ever constant supply of fresh air and its likelihood of containing dust. Where a system of this kind is used, every precaution should be taken to insure a supply of clean air to the furnace, and then to further safeguard the work by arranging a box screen of muslin cloth over the register. Stoves can be made to do, but here the precautions against dust must be rigidly enforced. As a uniform temperature is desirable, hard coal should be burned, and the care of the stove so regulated that attention would not be required during the application, or first few hours of drying of the finishing varnish coat.

As the handling of coal and ashes is a constant source of dust, the service side of the stove should be so arranged that it can be gotten at through the wall or partition without entering the finishing room. Such an arrangement can be easily worked out by enclosing the stove in a sheet metal drum which rests within the finishing room, but has its opening on the outside.

Guarding Against Dust

All of these details regarding heating, apply to the finishing room for it is in this room that we must have no dust. And it is also necessary to have here a temperature of at least seventy degrees, in order to get the best results with the varnish. Paint is brushed onto a surface, but varnish is laid on and then allowed to flow out into a uniform film and dry. In order for varnish to flow properly, the proper degree of heat should be maintained, and this is usually between 70 and 80 deg.

In summarizing, we see that an ordinary clean room will do for the first coats, but for the last coat of finishing varnish, absolute cleanliness is essential for the finest work. Plenty of light, daylight or artificial. Plenty of fresh, clean air. Clean heating equipment for the finishing room and such that a uniform temperature can be maintained. As every garage has its heating equipment, it is evident that the addition of a paint department is but a matter of arrangement.

A Department of BETTER BUSINESS



Conducted by Ray W. Sherman

Getting Rid of High Priced Used Cars

Maybe this is true of your business. A certain dealer found that many prospective buyers in his used car department demanded small cars. And the dealer had a lot of large and medium-sized cars.

Here's what he did: He took from the license lists the names of owners of small cars which were not yet very old. To all of these he sent a letter which ran something like this: "Wouldn't you like to drive a car which was a little roomier and more comfortable and more powerful than your present car? If so, you will be interested in visiting our used car department. We can arrange an exchange for your present car which we believe will please you."

The result was that the owners of Fords and Maxwells and Chevrolets and the other small cars traded their cars, plus a little money, for cars of larger size. The dealer then had no difficulty in selling the little ones, for which the demand was strong. And he got more for the big cars than he could have secured in any other way.

Aim at More—Not Less

Said the First Dealer: "It's a fine pair of orphans I have. Got two cars, thought I was going to go fine, and now the factory has gone out of business—or nearly so. I'll sure have to take a loss on those cars—and they cost me eight thousand dollars."

Said the Second Dealer: "Loss nothing! Make a profit—and a good one!" "How?"

"Easy! Just take a list of folks with money, preferably young sports who have more cash than they know what to do with and who are always anxious to have something no one else can have. Send them all a letter stating that you have the only two cars of the kind that ever will be sold in this part of the world. Tell them the cars are good, and that you will stand back of anything that's obviously defective and that you have a reputation and a shop to see that they run.

"Offer to paint them any color desired, offer to put on any equipment the man may wish, and when you find a prospect who wants a lot of this fuss and frill charge him enough so you come clean and make a profit. Don't mark them down! Advertise their sole quality—

which is exclusiveness—and mark them up.

"You can do it on orphans, used cars, fussed-up new cars or any other piece of merchandise—provided you hunt around a bit for the man who is willing to pay the price for exclusiveness."

And as evidence that this is true there

GIVE US THAT IDEA

If you have an idea that will help your competitor make his business better let him read it in this Department of Better Business. Send it in.

HAVE YOU A PROBLEM?

If you have a troublesome problem in the business or sales end of your establishment, send that in also, for perhaps your competitor or Motor Age can help you solve it.

For answers to problems—no charge. For acceptable ideas—one dollar.

might be added the story of the fashionable salon held one show time in a hotel lobby. One dealer, who put a vase and a few frills into a sedan, sold the car in the salon for \$1000 more than the same car could be bought for in the regular show.

Moral: Before marking anything down try marking it up.

Rich Men Can Be Sold Cheap Cars

In these days when folks are thinking a little more seriously than heretofore on how much a dollar will buy, it is worth while listening to the story of the man who sold Hupmobiles in Newark, N. J., seven or eight years ago.

One day this dealer saw a Pierce-Arrow going by and it gave him an idea. Forthwith he began a campaign on the owners of Packards and Pierce-Arrows. He told their owners that a big car was a wonderful thing, but that it was not nearly so economical or convenient for running about town and shopping as was a small car. He also mentioned the comparatively good quality which was obtainable in the small car the dealer sold.

To-day, in sections where there is a

gasoline shortage are many men who find their big cars difficult to run, yet they don't want to part with them, for some day the gasoline will return. In other sections men are watching their operating costs, but they are not parting with the big cars, because better times will return. In the interim, why isn't it a logical purchase for these well-to-do people to haul a small car in the garage and use it for runabout work instead of working the big car all the time. Every man who owns a \$4000 or \$5000 car should also have one that costs \$1000 or less. Go tell him so.

Saving on Small Items

Here's one that is told by Harry G. Moock, manager of the National Automobile Dealers association:

A dealer, from his office door, saw a workman carelessly stand a broom against the side of the driveway, only to have it slide down into the driveway. A moment later another man carelessly drove a car over the broom and ruined it.

The dealer called his men together and said: "Boys, this broom cost us ninety cents. Our business nets five per cent. That means that to pay for this broom we must do eighteen dollars worth of business. Instead of going ahead this morning making money we now have to stop money-making and mark time while we do eighteen dollars worth of business to pay for this broom. The man who let this broom fall down would have done the equivalent of eighteen dollars worth of business if he had taken the time to put the broom where it would not have been broken.

"The man who let the broom fall down may not consider that he is salesman enough to sell a tire, or sixty gallons of gas, or anything else, but he would have done something just as important as selling had he saved the broom that costs us only ninety cents."

When explained in that way carelessness meant something to the boys in the shop.

Paper Is Worth Money

Nobody knows better than MOTOR AGE that paper is worth money. All of which suggests that perhaps some dealers and garagemen are passing up a chance at a small saving in their waste paper.

Every business man gets circular letters, literature, newspapers, and all sorts of things, which are of no use and are thrown into the waste basket. This

waste paper, however, will be bought for real money by some junk man. All that is necessary is a paper baler and the delegation to some person of the job of gathering up the waste paper and baling it. A paper baler can be made or bought. But never throw away a *MOTOR AGE* or any other business paper that contains ideas for your business.

A Drive Every Day

Out in Monterey, Cal., is the Winston Auto Co., which, besides selling several cars and running a garage and shop, has one of the finest accessory and supply departments to be found. It is just inside the door where it is seen by every prospective customer. There is a showcase, shelf display and a generally fine merchandising arrangement.

Just how to go about moving the great variety of stock in such a department might puzzle some dealers and garagemen, but here is how the Winston people do it.

Every day they have a drive on some article. For example, some day they may decide: "To-morrow we'll sell body polish." The next day every man who stops for gas, or who comes in contact with the garage for any other purpose, is approached on the body polish question. Lots of people have often thought of polishing the car, but they don't think of it when they're where they can buy the polish. The next day the drive is on something else. With each drive the goods are displayed on top of the showcase.

In addition to the drive idea, the three or four men about the front of the garage run a friendly competition to see who can sandwich in the most sales.

When and When NOT to Sell Trucks

The dealer who is just starting in to sell trucks often—and too often—makes a beginning by assuming that his first and most logical prospect is the man who is engaged in the trucking business, such as truckmen, transfer men and others whose sole business is moving things with vehicles.

The truth is that this man is NOT the best first prospect, and the reason why follows: The transfer man's entire income depends on his transfer business. As long as the truck is in service he has a good income, but if the truck is laid up for service his entire income stops, and, if he has purchased the truck on a time basis, he may have difficulty meeting his payments.

On the other hand, the hardware man, the department store man, the building contractor and many other lines simply use the truck as a piece of machinery for PART of their businesses. If their truck is laid up for a while the income of the business does NOT stop, and the firm is still able to meet the time payments, providing the sale is on this basis.

Wherefore, don't make a grand rush after the transfer man. Make your hardest effort to sell some responsible house which can meet its payments even if the truck breaks down—as many are

bound to do once in a while. If you do sell a transfer man, make sure the arrangement is such that the truck will not come back on your hands at a loss.

Bonus for Men Beat the Complaints

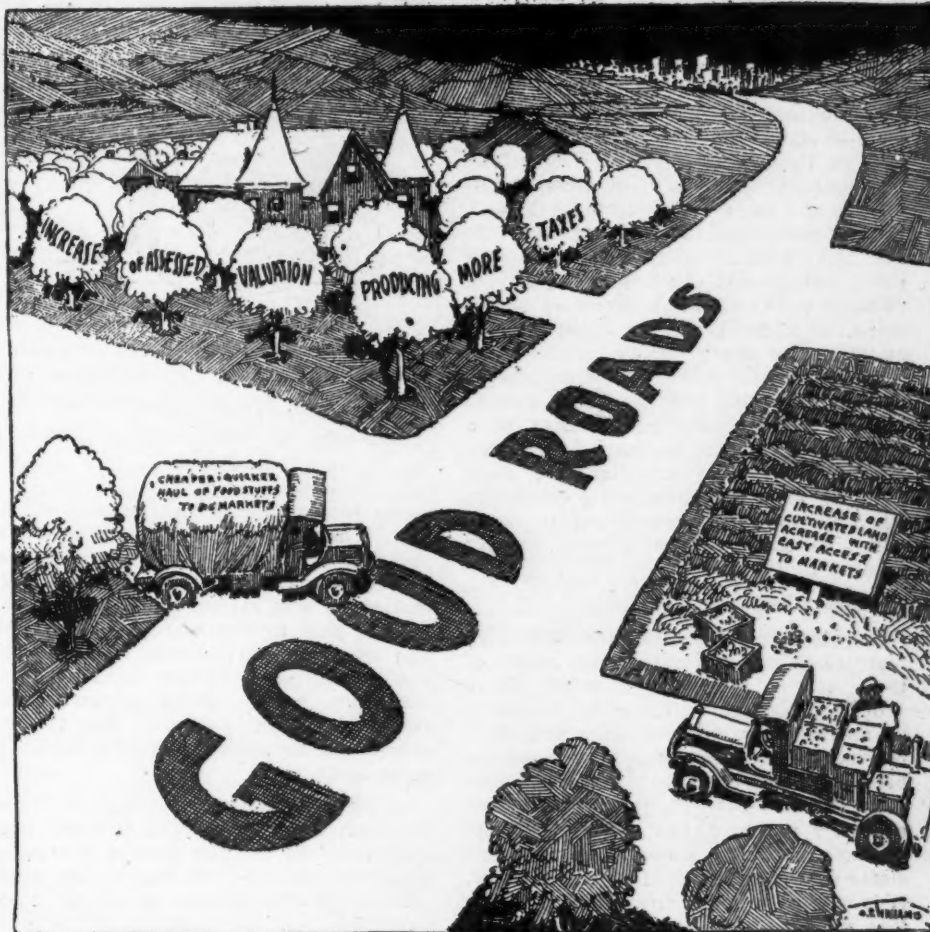
There was once upon a time a dealer—who was not unlike other dealers—who had complaints regarding his shop work. He said the usual things that are said by dealers when troubles of this kind pile up.

After long cogitation he worked out a bonus plan. He offered a bonus of a fair size for each man concerning whose work there was no complaint. This was in a shop big enough to maintain an inspection system, and the inspectors were held rigidly to the system.

Every complaint was a black mark. A perfect score meant a certain bonus, and it didn't take many black marks to eliminate the bonus entirely. It made the men more interested in turning out complete jobs and had a substantial benefit.

A Short Route to Prosperity

Copyright, 1920, by Star Company.



JUST A WORD ABOUT GOOD ROADS

NO matter what your place may be in this great automotive industry, one of your major jobs is the support of the good roads idea.

If you have no authorized bond issue for roads, talk to every man you meet on the subject, get other men to talk on the subject and see if you can't get the Chamber of Commerce or some other organization or leading man to take the subject in hand and begin a movement for road bonds.

If you have a bond issue lend every force you have to its support. When the National Automobile Dealers' Association or any other association asks you to write to a congressman or legislator in support of a roads bill DO IT. Don't leave the job to your neighbor, because

he probably will do the same thing.

It is one of the shames of the industry that out of four hundred members in a certain association in this business only TWO responded to a recent appeal for support of a good roads measure. WHY DID NOT MORE HELP? If you were one of the four hundred WHY DIDN'T YOU HELP?

Every time you talk to a farmer emphasize the ideas in the cartoon on this page, which is taken from the *Chicago American* of July 23. Show this cartoon to the farmer and point out how good roads increase the value of his land.

The greatest expansion of the automotive business of the future will be due to good roads. Help it along.

Interpreting the Voltmeter Reading

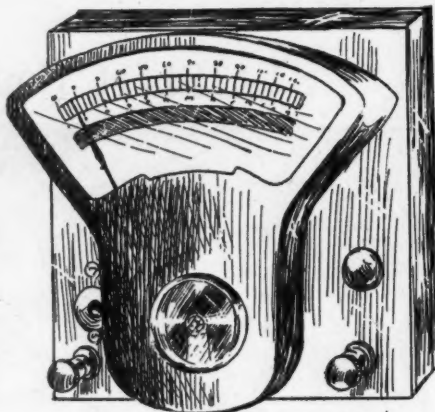
One Is Able to Glean As Much Information with an Ammeter and a Voltmeter As Can Be Determined by Any Other Means. For This Reason These Two Instruments Are an Indispensible Part of the Testing Equipment in Any Electrical Department

THE voltmeter is in conjunction with the ammeter one of the most needed pieces of equipment around a shop, doing any degree of electrical work on motor cars. In fact it might be said that no electrical service station or any service station professing the capability to render service on motor cars, is complete or competent to handle its work unless a voltmeter and an ammeter is part of the equipment. There will probably be some who will take exception to this statement, but it is felt that it will be those who have not tried these instruments from the standpoint of getting at the facts of the trouble through the interpretation of the reading. To one not familiar with what either of these instruments can tell in the way of "what's wrong" with a piece of equipment, it is most pleasurable to watch another who can properly interpret the readings of the meter and thus get at the root of the trouble. One not so skilled might apply a voltmeter to a storage battery and because the reading is 6-volts, would unhesitatingly state that the battery was in good condition, when it might register 6-volts pressure and still have only a specific gravity reading of 1200.

Voltmeter Indicates Pressure

A voltmeter is a pressure indicating instrument. It determines the height of the level of the wire network above ground pressure, which might normally be termed zero. A voltmeter is a high resistance instrument and necessarily so, because it registers pressure. A common pressure gage for the measurement of water pressure, has a very high resistance to flow. In fact, a pressure meter for water is closed against all flow. It is similar to a diaphragm placed in the line which will deflect a proportionate amount for each increase in pressure. With a voltmeter the operation is very much like that of a diaphragm. The shunt coil of the meter is the diaphragm whose resistance to flow is so high that there

BY ROY E. BERG



A voltmeter of the portable type with several scales capable of reading voltages from 110 volts down to 3 is one of the most necessary adjuncts to any electrical service station

is no perceptible passage of current at all. When an ammeter is connected it should therefore be connected across the line or in shunt. With the ammeter though as was explained previously, the rate of flow is that which is measured, and inasmuch as the rate of flow must not be hampered by any measuring instruments which would otherwise decrease the rate, it follows that the resistance of the ammeter must be as small as possible.

A voltmeter is not usually found on the dash board of a car. Directly connected to the battery it does not mean much as gives the reading of the pressure when the battery is idle or comparatively so. A discharge of several amperes does not make any material difference with the voltage of a battery if it is in fairly good condition. Even when it is very low in capacity through sulphation, it will still continue to light

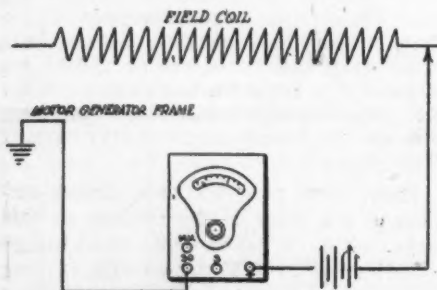
the lights with as great intensity as it did when in good condition. For this reason it is unwise to pass judgment on a battery when the sole information is that obtained from a voltmeter reading.

If the voltage of the battery holds pretty well near the 6-volt mark during the period when the starting motor is running, then it is an indication that the battery is in good shape.

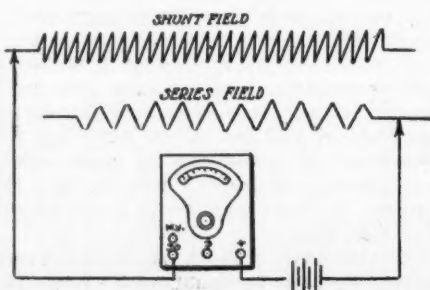
Best Use of Voltmeter

The wisest use for the voltmeter will be found for testing apparatus apart from the car. Generators on the bench can be tested very quickly with the aid of a voltmeter. For example if assurance is wanted that there are no grounds in the field circuit or the armature circuit, connect in series with the field or armature, one terminal of a 6-volt battery, coil and the battery. Connect the other line of the battery to the voltmeter, using the 30-volt scale. From the other side of the voltmeter run a wire to the frame of the generator. It is best to use a test point of some kind as better connections can be made to the frame. The enamel very often prevents a good contact being made and the ordinary piece of stranded wire will not make a good penetration of this insulation. If after probing the various frame parts with the test point and it is found that there is no reading of the meter, then the generator is free from grounds. Most generators have a ground connection so some care should be exercised to see that both sides of the field coil are disconnected from the ground terminals before making this test, else the meter will be sure to give a ground reading.

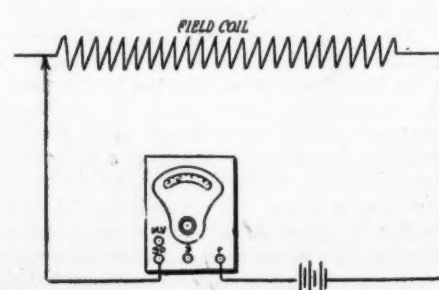
In testing the shunt field of the generator, the field connections should be severed at each end of the coil and the voltmeter and storage battery both connected in series with the coil. If there are no open circuits in the field coil, the meter will read about the same as it reads directly across the battery, but if



Testing the field coil of a generator for grounds



Testing the shunt field of a generator for open circuits



Testing the series field and shunt field of a compound generator for any interconnection which may have been caused by insulation breakdown

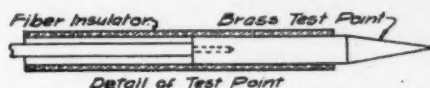
there is an open circuit there will be no reading. If there is an open circuit that is grounded and the broken wires are grounding back on the frame, then the reading will be less than the battery voltage.

Many generators on the market have what is known as a series and shunt field coil. These coils are employed together to give differential regulation, and the action obtained is similar to that obtained from a third brush or bucking field regulator. If a generator gets unduly hot and the coils become inoperative, one of the first tests to make is to see that the individual coils are not interconnected due to any failure of the insulation. This is done as shown in the illustration. Connect one wire to the series field and the other to the shunt field. These wires should be connected to the voltmeter and the battery both of the larger being in series. Now if there is any connection between these two coils a reading will appear on the meter which will be somewhat less than the battery voltage or which might be equal to the battery voltage, if the short circuit is rather close to the near side of the coils.

If a cutout is not functioning as it should, do not at first blame the cutout, because it is one of the most dependent parts of the electrical system. It depends upon the generator for its operation. If the generator voltage is not high enough to pull the solenoid of the cutout down, then the trouble is with the generator and not the cutout. Of

should be 7. Less than this will insufficient to operate the cutout. By increasing the charging rate one or two amperes this can be remedied. However, an increase in the charge rate is not recommended unless the battery actually needs it as can be proved by a reading of the specific gravity.

We have prepared a chart which is shown herewith which gives a picture in course, things can happen to the cutout just as well as anything else, but the contact points of the cutout are generally to blame, and a little dressing with a fine file will fix them up. Apply a voltmeter to the terminals of the generator and observe the voltage at the moment the engine speed is equivalent to a corresponding car speed of 8 to 10 miles per hour. At this point the voltage



Another style of test point which is very handy for general testing

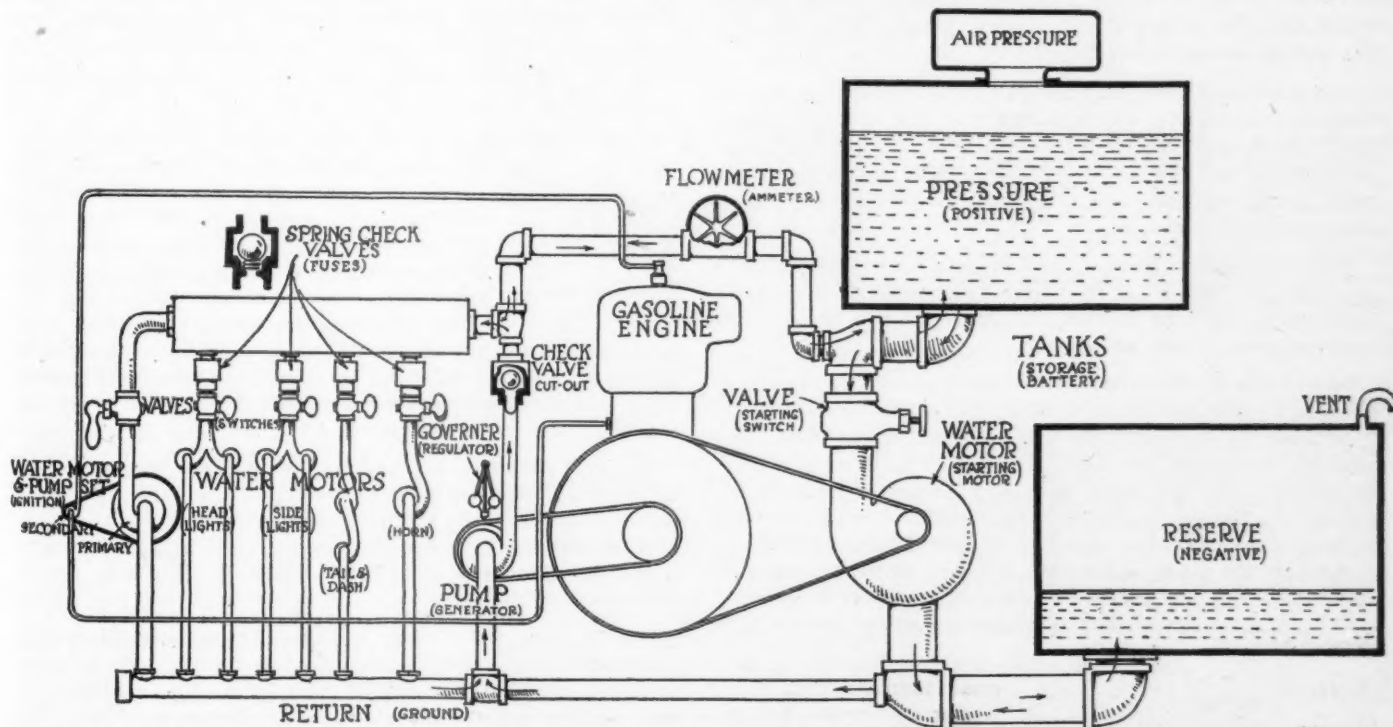
simplified form of the whole electrical system. From this it can be seen that there is a pressure at any place on the circuit and this is the pressure that is measured by the voltmeter. It can be seen from this that the whole electrical system is very much like a water supply system, except that no water is ever drained from the circuit. What is used to do work is stored up in the reserve

until such time as the generator replaces it to the pressure or positive side of the system. Whatever flows out from the positive side of the battery to negative side is measured on the meter. Whatever is replaced by the generator is caused to register on the meter. We suggest a study of this chart for there are many things concerning the electrical system that become easier to comprehend after this analogy is perfectly understood.

MILES BACK FROM EUROPE

New York, Aug. 2.—S. A. Miles, general manager of automobile shows for the National Automobile Chamber of Commerce, has returned from a four months' trip to Europe, on which he was accompanied by Mrs. Miles. He made the trip for recreation but naturally looked into the status of the industry in England and France which were the only countries he visited.

Mr. Miles toured 4000 miles in his own car over England and was impressed with the fact that the country is recovering from the effects of the war. The automobile industry there is not progressing as rapidly as it was hoped it would, however. This is due largely to general industrial conditions which closely parallel those in the United States. The recovery of France has not been so marked. Mr. Miles does not believe there will be much of a market there for some time to come for the more expensive American cars. This is partly due to the almost prohibitive duty.



A water analogy of the electrical system on a car. The storage battery is represented in two sections, the positive and negative side. From the positive side of the battery the battery discharges into the negative side after first doing the work of lighting the lights, running the starting motor or the horn. The generator replaces the current or water in this case from the negative side to the positive side of the battery. All movement of current except that which flows from the generator up through the lighting circuit direct, is registered on the meter. Check valves which will automatically close when the rush of flow becomes too great are used to represent fuses



EDITORIAL



THE DEALER THE BANKER AND THE MOTOR TRUCK

and that right of way in credit lines must be given to almost everything other than cars and trucks.

However, the situation is by no means what it should be. There are many bankers who still maintain their frosty attitude toward the motor car industry. Some of them go so far as to tighten up unreasonably on the motor truck, and because of the condition which prevails the motor truck manufacturers are taking steps to combat the attitude.

For example: One distributor in a southwestern city received eight trucks. He had presumed with good reason that the banker would help him take them up when they arrived. But the banker changed his mind and the trucks are warehoused at the manufacturer's expense. Another received twelve trucks. The banker went back on him and the dealer can see no way out except to retire from business.

Today's Condition

In some sections the bankers take a reasonable attitude and recognize the bigness and importance of this industry, but in other places they take the wrong attitude. The reason for the attitude is that they are NOT INFORMED as to the motor truck industry. They are passing an opinion on something they know little about.

They are open to reason, however, and many of them have listened with interest to the convincing stories told them by truck men about the essential character of the motor truck and the industry that produces it.

One of the dealers mentioned wished to sell his trucks to farmers for the movement of food stuffs, but he couldn't do it because the banker would not help finance the sale. The banker's contention was that he "couldn't take truck paper." He failed to see the truck as a very necessary machine for getting the harvest to market. Why should the banker offer to finance the grain but refuse to finance the machine necessary to get the grain to market? It's like giving a housewife a barrel of flour but refusing to give her a stove and then expecting her to bake bread.

Need for Action Today

We have a great industry with many factories, all turning out trucks and an army of dealers ready to sell the trucks. If the entire industrial and trade structure can be held together for three months, until the stringency passes, it will be able to ride by in good shape.

The situation is much like that which we have had in connection with the railroads, our other great transportation industry. The railroads cried and pleaded for help several years ago. They declared that unless they would be let to keep

themselves in good condition, even if not let to expand, that the time would come when the railway system would break down and a serious situation would result.

Those in position to extend help to the railroads were not farsighted enough to see the conditions of today. The help was not extended. The railroads were suppressed and throttled, and today we have the condition which the railway men said would come. We have a decrepit, broken-down railway system, with goods jammed on loading platforms and in terminals, with millions of dollars of needed credit tied up in transit, and with all of the adverse conditions of today mostly traceable to the railroad breakdown.

The Story of the Railroads

The one great and immediate possibility of relief for the railway jam is the motor truck. It is the coming transportation factor in our great country. It can step into the breach and do a great work. The country is rapidly waking up to the service that the motor truck can render, and, before many months have passed, there will be a great movement for the adoption of the truck as a relief in this transportation difficulty.

When that time comes the country will cry to the motor truck industry for relief. Let it not be possible in that day for the motor truck industry to say: "We told you so. We told you that unless you gave us help we would not be able to help you when you needed assistance. We told you the story of the railroads and you didn't listen."

There are dealers in every city with amounts up to \$150,000 and \$200,000 invested in truck businesses. Purely as units in the local business scheme, these dealers are entitled to support from the banks. And how much more are they entitled to support from the banks when they are engaged in selling the one thing that is the country's greatest need today? Bankers should open their eyes to the truth. They should not let the garden dry up in order to save on the water bill. The time will come when the garden will prove its worth.

Dealers Need Credit

The truck dealers, as a matter of business economies, do not all demand a maximum of credit in these days of a credit stringency. But they are entitled to enough financial assistance of all kinds to enable them to pay their overheads, maintain their organizations and sell trucks to those who are in extreme need of them.

The National Association of Motor Truck Sales Managers has planned some definite work on this subject, but the sales managers can't do it all. They need help. Every dealer can help, and he can get other influential men to aid him. The need today is for the true story of the industry and its product to be told to the bankers in an emphatic way, so they can know the truth. Many of them are merely uninformed.

Action should be taken at once in every locality where the banker is unfriendly to the truck. Dealers should make an issue with the banker and not accept his often unfounded reasons for his attitude. Right and the nation's necessity are on the side of the dealer and the truck factory.

Outlook for Business Brighter

Factories Not Curtailing Their Plans for Future—Slow Months Show Weakness in Truck Situation—Bankers Urge Caution and Business Sagacity

DETROIT, Aug. 2—While production is running at about 60 per cent normal in the passenger car field, due far more to a breakdown in the transportation situation than to a slacking of demand, factories in this vicinity are not curtailing their plans for the future.

One of the most interesting phases of the situation is that every concern which has been known for its sound, well developed, merchandising policy, is having all the business it can take care of. Concerns which have relaxed their vigilance during the past two years of what has been a seller's market, are feeling the effect of the present situation to a far greater than usual degree.

Demand Exceeds Supply

In fact, the opinion of leading executives in this vicinity is rapidly reaching the conclusion that in the present situation there is a great deal more smoke than fire. Charles D. Hastings, president of the Hupp Motor Car Co., stated today that in view of this situation he had instructed the sales department to make a careful canvass of all orders on hand for the purpose of checking off those which might in any way seem doubtful, on account of the credit situation. He states that the sales department returned with 1500 more orders than were originally included in the list. As this seemed out of line with the general situation, he ordered an independent report by the company's auditors and the auditors returned with a report containing 150 additional orders. He reports a tremendously strong export market.

The Cadillac Motor Car Co., which has been always known for its sound merchandising policy, finds a similar situation. Lynn McNaughton, sales manager, states that demand is considerably ahead of supply and there is every indication that this condition will continue to exist.

The Scripps-Booth Co., according to President A. H. Sarver, has had more applications for agencies during the last few days than at any time during six months. This concern is turning out about 1500 cars a month with a daily production which reaches at times in excess of seventy.

Sales Department Optimistic

These passenger car companies chosen at random are representative of various classes of cars and there is little or no gloom to be noticed around the offices of the sales departments. In fact, there is a feeling of rather welcome surprise that in spite of all the pessimistic rumors to be found throughout the entire country, business continues to be as good as it is.

The Maxwell-Chalmers factory, which has been closed down for the past ten days for inventory, has reopened. The

curtailment of power locally by the Edison company on account of the failure of part of its turbine equipment, will prevent full production schedule at once, but by running night shifts in some of the departments, it is expected that practically full production will be reached.

The truck situation is not as strong as the passenger car field. It must be remembered, however, that July and August are notoriously slow truck months. There have been a number of layoffs on the part of parts manufacturers supplying the truck fields, and one Detroit engine manufacturer has closed his plant until fall. But that all is not gloom in the truck business is evidenced by encouraging reports that some of the factories are receiving from their dealers.

There is being held today in Grand Rapids a meeting of farmers to talk over methods of moving the plum crop, and motor truck dealers are looking forward to sales in various parts of the cereal and fruit belts of trucks to assist in crop movements, as it is evident that the railroads will not be able to cope with the situation during harvest time. This same situation is now coming up in the vicinity of Kansas and that trucks will be needed to assist in the movement of crops all over the country is quite evident.

Empty Credit Reservoirs Must Be Filled Before Normal Business Is Resumed

NEW YORK, Aug. 2—Business depression, which apparently is increasing, should not be taken too seriously for at least a part of it unquestionably is due to the fact that mid-summer is at hand. This always is a quiet period, even in the best of times. For that reason it is easy to exaggerate present tendencies. This always is the dull season for retail trade and the same applies to manufacturing to a certain extent.

The usual seasonal inactivity coupled with very real credit and transportation difficulties, is having its psychological effect, however, and whenever a factory closes down for inventory it is construed in many quarters as meaning something entirely different. In some cases it probably does, but not by any means in the majority of cases. Even if "closed for inventory" is taken merely as a convenient excuse, it is by no means an ominous sign. It will permit elimination of inefficient employees, the strengthening of the organization and best of all it will relieve the credit strain.

In the next few weeks there undoubtedly will be a large crop of rumors about

failures and receiverships, actual and impending. They should be accepted with the greatest caution. Most of them will be untrue and circulation of them, if they are unfounded, will do great damage to the industry because of the psychological effect it will have.

It is apparent, however, that the country has entered upon another phase of the complicated financial and industrial readjustment to a peace basis. Caution, business sagacity, determination and courage are necessary to run safely through it. The time has come for digging but there is no occasion for undue alarm as to the fate of the automotive industry. Ninety per cent of it is absolutely sound and it will weather the storm with flying colors. There is no reason for panic but plenty of reason for serious thinking.

Reserves Depleted

Bankers in New York, which is the financial heart of the nation, assert that the credit reservoirs are empty and that they must be refilled before business can hope to get into anything like its normal stride. Huge quantities of capital were consumed in the war and enormous loans were made to the Allies. The capital cannot be restored and the loans cannot be repaid under present conditions. The individual banks loaned down to their legal reserves and then called on the Federal Reserve system for help. The Federal Reserve loaned until it reached its legal reserve early in the year.

The only way to bring further credit expansion is to encroach on reserves. There is no legal bar against the Reserve banks doing this but it is regarded as a dangerous expedient under present conditions and it will be done only as a last resort to avert an old-fashioned panic.

There is complaint in some quarters that the banks are hoarding their funds to loan them at high rates for speculative purposes to increase their own earnings. That may be true in isolated cases but it does not apply to banks as a whole, although they undeniably are profiting from high interest rates. In a nation as large and wealthy as this it would be a miracle if there were not some unfairness in the distribution of credit.

Liquidate Old Credits

The fact cannot be escaped, however, that the Federal Reserve banks are down to the danger mark in their reserves. There can be no credit extensions until old credits are liquidated. There can be no great easing of the strain until transportation conditions show a vast improvement. That time cannot come until the supply of rolling stock is materially increased and it takes time to build locomotives and cars.

Increase in Cost of Gas With Easing of Shortage

Shipments Made from Texas and Oklahoma Fields, Consumers Paying Freight

LOS ANGELES, Aug. 3.—When gasoline producers disagree the public has a chance to learn the truth. Salient features that have been revealed as the result of an investigation into the gasoline famine that has existed throughout Southern California for ten days are: an abundant supply of gasoline can be made available; the shortage has been permitted to come about intentionally on the part of the oil companies; the producers can provide relief and will do so but consumers must pay more for the gasoline.

Locally produced gasoline has been exported in enormous quantities because of higher prices that prevail in the Orient and eastern sections of the United States. Increased consumption has exhausted reserve stocks held for local use more rapidly than the oil companies had anticipated and this fact in conjunction with the big exportation created the shortage here.

No Price Reduction Expected

Seven trains of tank cars loaded with gasoline are now en route to Los Angeles from Oklahoma points. Other trains are to bring the fuel from Texas. The public will pay the freight at the rate of 2½ cents per gallon, the increase in price that has been agreed upon. There will be no interruption to exportation of locally produced gasoline and it is the expectation of the oil companies that by the time the imported fuel is consumed there will have been created a reserve of local gasoline. But there is no reason to believe that when that time arrives there will be a reduction in price.

City officials called a conference of representatives of the oil companies and all business interests that are large consumers of gasoline. The oil companies put up a battle to bring about the total removal of all gasoline standards. They sought to induce the city officials to go to neighboring towns where there are no standards and make comparative tests of the gasoline sold there. The automobile dealers and others opposed the removal of the specifications and made good on their contention. Then it was that the public got its first inkling of real facts.

The representative of the Union Oil company said his company could have a trainload shipment of gasoline in Los Angeles within ten days if the public wanted it bad enough to pay the price. The Standard Oil company superintendent said he represented the sales department and not the producing end of the business and he would agree to nothing. He would not take one gallon from the million in storage at a nearby plant destined for exportation to help relieve the local situation but maintained his

company would be able to take care of its regular customers.

There are about a dozen independent gasoline companies operating here. It developed at the hearing that these companies have, in the main, been buying their crude oil from the Standard and refining it into gasoline. That constitutes their "independence." Recently the Standard voluntarily increased the price it would pay for crude oil by 12 cents a barrel. At the same time the Standard practically controlled the supply of

More Fuel and Higher Prices Features of Coast Gas Shortage

crude. This meant the establishment of a new market price for crude and consequently enabled the Standard to charge the increased price to the independents. In the final analysis therefore the independents cannot produce gasoline profitably and sell it at Standard prices. At this time the Standard cannot meet the demand and this fact alone enables the independents to continue in the gasoline business.

PEORIA HAS GAS STATION BAN

Peoria, Ill., Aug. 2.—The first steps to a city zoning system in Peoria have been taken with the passing of an ordinance by the city council restricting the erection of garages and oil filling stations in the residence section. Where two-thirds of the buildings are residences it is necessary, under the provisions of the ordinance, to secure the consent of a majority of the property owners before the buildings can be constructed.

KNICKERBOCKER MOTORS FAILS

Poughkeepsie, Aug. 2.—An involuntary petition in bankruptcy has been filed against the Knickerbocker Motors, Inc., with a factory at Poughkeepsie. The company has manufactured a tractor adjustment for automobiles. David W. Kahn has been named receiver. The liabilities are said to exceed \$200,000 while the assets are placed at \$15,000.

BETTER ROADS FOR CANADA

New York, Aug. 4.—A G. Batchelder, executive secretary of the American Automobile association, has been in New York this week upon his return from Detroit where he went to join the Michigan Pikes good roads tour through the province of Ontario and back through Michigan. He said the Canadians were displaying increased interest in good roads and that an increase may be expected soon in constructive work along this line. Mr. Batchelder characterized the Michigan Pikes tour as a great success. He carried the message of improved highways into many of the towns where stops were made.

Coast Will Ask That Fuel Be Made a Public Utility

With Situation Relieved Attention Is Turned Toward Railroad Com- mission Regulation

SACRAMENTO, Calif., Aug. 4.—The shortage of gasoline apparently is at an end in California. The oil companies, notably the Standard Oil, are shipping millions of gallons of gasoline from Texas to relieve the situation here, and it is expected, according to announcements made by officials of the companies, the shortage will have been permanently relieved in another fortnight.

The announcement made by the Standard Oil Co. says it is shipping 120,000,000 gallons of gasoline to California. Other companies are shipping in lesser quantities, and the next four weeks, it is expected, between 125,000,000 and 150,000,000 gallons of gasoline will have been shipped in here, most of it coming from Texas.

What this will do to the price of the commodity is a puzzle. When the shortage in California became so pronounced that restrictions were put upon sales, the Standard Oil Co. discontinued its practice of furnishing Nevada with California gasoline, shipping the fuel from Utah and Wyoming. This resulted in a six-cent increase of the price. Whether the imports from Texas to California will be accompanied by a price increase, has not been announced.

Glad to Get It at Any Price

One of the theories explaining the gasoline shortage has been that the oil companies merely wished to weary the public into a frame of mind where a price increase, accompanied by plenty of gasoline, would not only be accepted without protest, but would be welcomed. This feeling has been brought about, as far as the motoring public is concerned, and there are few who would protest very vigorously if only they could get all the fuel they want.

There are others, however, who will protest, and vigorously. Prospective members of the State Legislature, which meets here in January, are being asked to make definite their positions on the proposed law to make gasoline a public utility and subject to the control of the State Railroad Commission, as are electricity, coal and natural gas, warehouses, etc. If this bill becomes a law, and there is a powerful public sentiment for it throughout the State, the price will be regulated by the Railroad Commission. Production and shipments cannot, of course, be controlled, but it is believed the measure would have a very salutary effect on the gasoline situation another summer.

The Associated Oil Co. has announced that with the opening in a week or two of its \$2,000,000 addition to its refinery at Aron, it will be able to furnish all the gasoline California needs.

Farmers Told of Value Of Tractor by Government

Report Published to Help Prospective Purchasers Estimate Their Needs

WASHINGTON, Aug. 3.—The Department of Agriculture has published and circulated throughout every farming community in the United States a bulletin designed to help the prospective tractor owner estimate his needs. The publication prepared by the Office of Farm Management represents the government's findings in investigations into the influence of the tractor on horse labor. In reality, the official study of tractor performances in seven states comprising the Corn Belt should stimulate interest in automotive equipment and quicken sales of all agencies.

The conclusions published this week represent an unbiased opinion of investigators after a year's study of tractor operations on 191 farms. The Department points out to the farmers that statements made and conclusions drawn must not be taken as final because the research was necessarily limited. The item of cost was not taken into consideration as the investigation was directed primarily to the physical relationship of tractor power to horse power.

Valuable Suggestions to Trade

The report contains many valuable suggestions for salesmen and manufacturers of tractors. The Government advises the prospective purchaser to consider only the type of tractor most suitable to the particular needs of the farm and not its advertised rate of horse displacement.

The principal facts brought out by the inquiry which will be held up to salesmen are summarized as follows:

1. The number of horses disposed of on 141 farms averaging 346½ acres, on which tractors had been used for a year or over, was 2½ per farm.
2. The average number of tillable acres per horse increased from 26½ to 38½ after the purchase of the tractor.
3. Nine operators out of 191 displaced horses entirely on plowing, disking, and harrowing.
4. Only 16 operators allowed their horses to stand idle while the tractor was in use.
5. The number of horses displaced by the tractors on these farms was governed by the number it was necessary to retain for corn cultivation and other work current at the same time, which the tractor could not do.
6. The horses remaining on these farms are doing about 75 per cent of the tractive work and tractors the remainder.
7. The tractor was used for an average of 29 ten-hour days per year on the home farm. No record of the amount of custom work done was obtained.
8. A three-plow tractor on these farms

does the work of 8½ horses in plowing, disking, harrowing, and harvesting.

9. After purchasing the tractor, the average size of the farms was increased by 22 acres, or 6 1/3 per cent.

10. The principal advantage of a tractor is its ability to do heavy work in a shorter time than it can be done with horses.

Three-plow machines outnumbered other types on Corn Belt farms. Plowing is the principal operation for which the tractor is used in the Middle West. It was found that on the average the days it is used in draw-bar work will outnumber those devoted to belt work. Certain operators have used tractors for eleven different operations, though for all farms the operations averaged about five. Fifty per cent of the operators used their machines as a source of power for sawing wood, in many cases saving the expense of the purchase of a stationary engine.

Road Damage Held As Basis for Heavy Tax

Truck Dealers Refute Claims—Fee In Cases Due to Desire for More Revenue

LOS ANGELES, Aug. 3.—Legislation derogatory to the operation of heavy-duty motor trucks is planned by boards of supervisors in a number of counties in Southern California. The state law permits the operation on the highways of motor trucks of a gross maximum weight with load of 28,000 lbs. and 800 lbs. to the inch of tire surface. But the separate counties have authority to reduce this maximum and some of them are seeking to go the extreme, as viewed by truck dealers. The reason for all the agitation usually is based upon the claim that the heavily loaded trucks are proving damaging to the highways.

When the supervisors cite road damage alone, truck dealers are in position to prove that the claims are in many instances unjustified. But the friends of the heavy-duty trucks are being confronted in some counties by supervisors who desire to impose a tax for purpose of increasing revenue and no other reason. This is the hardest obstacle to overcome. Claims of class legislation do not get very far and economic arguments are about the only ones that can be presented. "The trucks that do not belong here but operate over our roads should have to pay for the privilege", the supervisors say and it is the through haulers that are aimed at especially.

TRUCKS DISPLACING FREIGHT CARS

Marshalltown, Ia., Aug. 2.—To meet the shortage of railroad cars, motor trucks are being used to a large extent by farmers in this territory for long distance haul of grain. One farmer made five round trips of thirty miles each in one day and the practical worth of the truck to the farmer has been demonstrated during the harvest.

To Further Truck Sales By Advertising Campaign

National Association Acts in View of Present Acute Conditions

CHICAGO, Aug. 3.—Continuing the effort to keep truck sales up to normal, the National Association of Motor Truck Sales Managers, at a meeting of committees and directors at the Union League Club yesterday, planned an advertising campaign to run in thirty big city newspapers.

This copy will tell the story of the truck and the truck industry, will endeavor to remove any unfavorable impressions held by the public and is intended to have influence on those bankers who are not yet sold on the necessity of keeping automotive transportation going, as regards manufacture, sale and use.

Five advertisements will be run, every other day or every third day. The expense, estimated at \$89,000, will be borne by makers of trucks and parts.

Conditions in the truck field are becoming more acute daily and it is recognized that some important action, directed at the local banking interests, is needed at once. Truck makers feel that the present condition will improve materially by October and that the industry can be preserved in its present condition if methods can be devised for keeping a certain volume of output moving during the interim.

Some truck factory men have secured a lifting of credit restrictions by their individual efforts, and this work will be expanded, but it is considered inefficient for each individual banker to have to be sold on the idea by individuals from the industry, for only a limited number can be talked with in the time existing for work.

FEAR TRUCK OVERTAXATION

Cleveland, Aug. 3.—Touching specifically on that type of legislation which will probably overtax the commercial vehicle on the theory that our present road system is being destroyed by it, E. J. Shover, secretary-manager of the Ohio Automotive Trade Association, Columbus, urged upon the members of the Automotive association of the Cleveland Chamber of Commerce at its regular July meeting the necessity for organized effort in approaching legislators in the matter of legislation prejudicial to the automotive industry.

This one item, he stated, would probably be introduced in more legislatures than any other piece of legislation. He pleaded for the creation of a public opinion throughout the country which would place the responsibility for road destruction not on the commercial vehicle but on the lack of foresight on the part of the people themselves in not demanding roads of a construction capable of carrying the weight that is now being placed upon them.

Dealers Encouraged to Demand Prompt Payments

Early Buying Also Urged by Jobbers With No Decline in Present Market in Sight

KANSAS CITY, July 30—The Central West Automotive Equipment Jobbers Association held their quarterly business meeting here. The leading automotive supply jobbers in the southwest attended. The meeting was devoted to discussions for assisting the trade and clarifying the duty of the garage and equipment dealer to the jobber.

The Association is encouraging retailers to demand prompt payments from customers and take advantage of the new discount rule, of cash discount 2% and payment in 10 days, adopted by the jobbers. At present dealers here make payments on the tenth of the month following date of purchase.

The Association also suggested that retailers buy early and wisely. Jobbers here are far behind in their orders and shipments are uncertain.

The display of stock in an attractive and appropriate manner for the best advertising results was discussed. Equipment so arranged to meet the customer's attention will often make a sale where undisputed stock will be uncalled for according to the jobbers.

Dealers were urged to give publicity concerning their business to the trade journals and business papers serving the automotive industry, thus spreading new ideas and systems among the members of the industry for the benefit of all.

The unfairness of the dealer in returning goods to the jobber without notifying him of the reason for the return was discussed. Many jobbers order specially made goods which are returned to them without reason, causing misunderstanding and loss of customer.

The jobber is at present receiving only from 40 to 60 per cent of his requirements from the manufacturer of accessories. Many dealers are refusing to buy on the present market waiting for a decline. Jobbers here declare that no decline is in sight until next spring and urging dealers to purchase now for early needs.

BOYS VISITING MODEL FARMS

Baton Rouge, La., Aug. 2—The special train which is to carry 225 Louisiana High School and Agricultural College boys on a tour of the agricultural colleges and model farms of the Middle West, with a special view to the study of the use of tractors and trucks and other automotive implements in farming, will leave here August 3, and return about August 13. Expenses of the trip are being borne by the parishes of the state, virtually every parish having at least one boy in the party, and by various civic and agricultural organizations throughout Louisiana.

Professor T. H. Harris, state superintendent of schools, and Professor C. H.

Staples, of the agricultural extension department of Louisiana State University, will accompany the boys, many of whom have been students at the old agricultural college of Louisiana, and will continue in the new agricultural college. The majority of the boys intend to become demonstrators in agricultural methods and modern agricultural machinery. The new college plans to establish a school for the training of boys in the handling of trucks, tractors and other automotive farming implements.

TRACTOR DEALERS TO HOLD MEET

Bloomington, Ill., July 30—Tractor dealers of Logan County, Illinois, believe that a fall demonstration is advisable and voted to stage the event at the same time the fall Chautauqua was in progress at Lincoln, the county seat. A day will be chosen agreeable to the Chautauqua managers and an all-day plowing exhibition will be arranged. Fifteen firms have agreed to enter their machines and there will be an exhibition of all kinds of implements which may be operated in conjunction with tractors.

Unusual Growth Shown By Trade Association

Promotion of Teaming Together Spirit in Trade One of Its Important Features

WILMINGTON, Del., Aug. 3—Holding it up as a shining example for the new Wilmington Automobile Trade association to follow, President L. G. Block of the Philadelphia Motor Trade association sketched the interesting career of the latter body in an address before the local organization a few days ago. The Philadelphia association started from a very small beginning but now has assets around \$50,000, and a meeting room of its own, where daily lunches are attended by members prominent in the trade and industry. On account of carrying a share in the holdings of the association, memberships are now held at \$500 for the initiation fee.

At even greater value than this monetary consideration Mr. Block considered the function of the club in promoting the teaming together spirit in the trade which he counted as a factor of far reaching influence. He praised the evidence of this tendency which he found among the local club membership and predicted a similarly favorable outcome if the interest is maintained. At present the local organization has no headquarters, holding weekly luncheon meetings at the Hotel duPont.

ASSOCIATION INCREASES FEES

Chicago, July 30—The Chicago Automobile Trade association has adopted a membership fee of \$150 for Class A members and \$75 for Class B. Class A dues have been raised from \$48 to \$60 a year and Class B from \$24 to \$35. Class A members are those who sell vehicles; Class B includes allied interests.

Adopt Novel Plan to Finance Used Car Sales

Measures Being Taken to Meet Difficulty Which Has Arisen From Restricted Credits

KANSAS CITY, Aug. 3—Used car sales are holding their own here, especially with reference to the cheaper makes, though many dealers who take used cars in exchange are having difficulty in financing their sale profitably under restricted credit conditions. While most of the motor financing companies are demanding a fifty per cent first payment, some dealers who are handling their own paper are selling used cars at as low as thirty-three and one-third per cent first payment. The stronger dealers are taking buyers notes and holding them until maturity at rates of interest from eight to twelve per cent.

A novel means of financing used car sales was instituted recently by the Motor Finance Corp., retail distributors of the Severin and Elcar sales, in a five-day bargain sale with unusual terms offered to buyers. Buicks, Oldsmobiles, Overlands and many other makes were sold on the time payment plan without interest for six months. The purchaser was allowed from six to twelve months time to make complete payment. After six months the buyer will be charged from 8 to 12 per cent. Payment down required was from 33 1/3 to 50 per cent. The used car paper is not discounted but is held until maturity and the time sales are financed through the corporation's own resources.

"In assuming the six months interest on used cars the corporation is merely taking the \$30 to \$100 sale discount which the purchaser does not readily appreciate on the net price of a car," said H. A. Lewis, president of the Motor Finance Corp. "In case a customer desires to pay cash for a used car the amount of six months interest is deducted from the price of the car."

TENNESSEE CONVENTION ENDS

Chattanooga, Tenn., Aug. 2—Discussions relative to methods to be adopted for the protection of automobile dealers against unfair legislation were held by the Tennessee Automobile Trade Association which has closed its annual convention here. There was also criticism of federal reserve boards which prohibit banks from carrying notes of purchasers of automobiles. Other matters, inclusive of the betterment of roads, were taken up for consideration. The following officers were elected: James S. Frazier, Nashville, president; T. H. Smart, Memphis, vice president; R. Henry Hart, Chattanooga, treasurer.

OVERLAND BUSINESS GOOD

Toledo, Aug. 3—The Willys-Overland Co. finds business conditions good enough throughout the country to warrant full production. About 600 cars are being produced daily, of which 100 a day are the Willys-Knight type.

Branch Organizations Developed by Hare's

Corporation in Carolinas and Connecticut—Mercer Car Output Doubled Since January

NEW YORK, Aug. 3—Organization of Hare's Motors of the Carolinas was announced here to-day. Its headquarters will be in Greensboro, N. C. The president of the corporation is W. G. Tennielle, who has been active in the hotel and real estate business. Other officers are: Vice president, Dr. W. F. Fortune; secretary, H. S. Wootten, formerly of the Southern Railway; sales manager, W. R. Wood, widely known in the automobile trade; treasurer, R. S. Latta. The organization will serve a dozen cities and a population of 500,000. Display rooms and a maintenance station will be erected in the business center of Greensboro and there will be dealers in all the larger towns of North and South Carolina.

Hare's Motors reports that production of Mercer cars has been doubled since January. This has been accomplished by making improvements in the plant at Trenton. The progressive assembly system has been carried out as far as possible and the work of manufacture speeded up in all departments.

Hare's Motors of Connecticut has been organized and will open early next month with branches in New Haven, Hartford and Bridgeport. Dealers will be appointed in the other large towns of the state. Roger J. Gilmore, who has been president of the Packard Motor Car Co. of New York, is president of the new organization. Harry F. Flowers, vice president and general manager, was manager of the Packard branch at New Haven until recently. E. R. Hunnewell, Bridgeport branch manager, has been vice president of the Cleveland Automobile Sales Corp. in this city.

WANTS SHIP-BY-TRUCK TERMINAL

Spokane, Aug. 3—In addressing the members of the Spokane Automobile Chamber of Commerce, Mayor Charles Fleming stated that the most important duty they owe the city is their support in establishing a short-haul-ship-by-truck terminal depot where foodstuffs from the surrounding country may be delivered.

"If Spokane and the automobile men could establish an automobile terminal depot where foodstuffs could be delivered by trucks and sold at a price less the large freight charges the matter of the high cost of living would soon be cut down," he said.

BUSINESS IN NEW ORLEANS GOOD

New Orleans, Aug. 2—Business in the automobile and equipment lines generally is good and sales are holding up surprisingly well for the summer when a large part of the people who are able to buy cars and who, therefore, furnish the majority of the prospects are out

of the city not to return until the beginning of next month.

Stocks in hand are somewhat limited due to delays in transportation. The total value of new cars now being carried by New Orleans dealers is estimated at approximately double that of the stocks on hand one year ago. Ten new dealers have entered the trade during the last twelve months and all appear to be getting their share of business.

Dealers appear to be somewhat more conservative than they were this time last year and larger sums are being required as first payments on cars than ever before in this section.

DEALERS HAVE OUTING

Chattanooga, Tenn., July 29—The annual picnic and outing of automobile dealers, accessory, repairmen and garagemen was held last week under the auspices of the Chattanooga Automotive Trades Association. Topical discussions were held and it was decided to exhibit at the autumn interstate fair to be held at Chattanooga.

Small Dealers Hit By New Law Covering Parts Stocks

All Handlers of Farm Implements Must Carry Full Lines — License Fee Lowered

BATON ROUGE, Aug. 2—A law recently passed by the state legislature which became operative Aug. 1 provides that dealers in agricultural implements must carry at all times a full line of parts for these implements, this requiring every dealer in trucks and tractors to carry complete lines of repair parts for such automotive vehicles though he may not sell more than two tractors or a couple of trucks a year. While the larger distributors in New Orleans are in favor of the law the smaller dealers in the country claim that many of them will have to discontinue handling trucks and tractors as they will have too much money tied up in parts.

Small garages and service stations in the state are able to operate jitneys through the enactment of a law which repeals the old statute requiring a \$2000 bond and requires merely a fee of \$15 to permit operation.

OPENS ACCOUNT DIVISION

Chicago, Aug. 2—James V. Lyons, formerly of the American La France Fire Apparatus Co., has opened a national account division with headquarters here for the Sales Cushion Wheel Co. of Detroit. The sales of the company for the first six months of this year have shown an increase of 136 per cent over a corresponding period a year ago due in a large measure to the opening of sales offices in Los Angeles, San Francisco, Portland, Seattle, Butte, Salt Lake City, Atlanta, Memphis, Nashville, Akron, Steubenville, Wheeling and New Orleans.

State Fairs Ask Staging Of Rural Express Lines

Exhibition at Syracuse Is Only One Possible Because Field Men Are Not Available

NEW YORK, Aug. 2—Directors of the leading state fairs in the country seem to have been thoroughly sold on the value of rural truck express lines. Eleven of them have invited the motor truck committee of the National Automobile Chamber of Commerce to stage exhibits, but the only one which the committee will attempt to put on will be at the New York state fair at Syracuse, Sept. 6-11. This will be similar to the one which aroused much interest last year.

Field Men Not Available Formerly

It has been necessary to decline to take up the work actively at the others because field men to put on displays are not available. The states which are eager to have rural motor truck express displays are Missouri, Pennsylvania, Wisconsin, Indiana, Massachusetts, New Jersey, Vermont, Alabama, Mississippi and Louisiana. The interest shown is in marked contrast to the comparative lack of enthusiasm displayed last year, according to F. W. Fenn, secretary of the motor truck committee.

MERCHANTS HELP PARKING LAW

Kansas City, Aug. 2—A law recently passed by the city council allows the parking of automobiles for the period of one hour on a majority of the streets but does not lift the prohibition which affects standing motor cars on east and west thoroughfares. For some time all parking in the business district was stopped until downtown merchants claimed that the old ordinance under which all parking was forbidden, cut into their sales.

FORD SELECTS BODY SITE

Iron Mountain, Mich., July 29—The Ford Motor Co., Detroit, has selected Iron Mountain, Mich., as the site of a large branch factory for the manufacture of materials and stock for passenger car and truck bodies, with the intention of building complete bodies at this point. Work will start at once on the erection of a sawmill, planing mill and power plant. Iron Mountain is in the heart of a vast timber belt, which fact induced its selection as the point of operation for body manufacture.

FORM AUTOMOTIVE TRADE COUNCIL

Chicago, Aug. 3—The Chicago Automotive Trade Council has been formed to effect a closer cooperation between the allied interests in this city. It is composed of three delegates from each of these associations: Chicago Automobile Trade Association, Chicago Garage Owners Association, and Vehicle Manufacturers Association. The latter includes mostly body makers. Monthly conferences are held.

Tractor Display of West Bringing Many Exhibitors

Reservations for Space at Los Angeles Show Being Received at Rapid Rate

LOS ANGELES, Aug. 2—Sixty-five thousand feet of space has already been reserved in the National Tractor and implement Show of the West which will be held here Sept. 20 to 26. The attendance is expected to be larger than ever before due to the great interest being shown by manufacturers, distributors and dealers in automobiles and farmers living in nine western states and by dealers and farmers who are in California temporarily. Word has been received from many South American, Mexican, Canadian and Far Eastern exporters of tractors and farm implements that they plan to attend.

Workmen are now transforming the Herdugo woodlands to take care of the show. The management will permit machinery to operate under its own power and special contrivances are devised whereby the various exhibitors can demonstrate their still exhibits. Special feature days have been arranged, with leading national authorities present to speak from the spacious natural amphitheater on the grounds.

SACRAMENTO SHOW SEPT. 4 TO 12

Sacramento, Calif., Aug. 3—Preparations for the Annual Automobile Show at the State Fair, to be held Sept. 4 to 12, are being developed by the Sacramento Motor Car Dealers Association. The show is held in tents, as the buildings have not been replaced since the fire of several years ago.

Where two tents were used for the automobile and accessory shows in former years, however, three or four will be needed this fall, according to Secretary Royal Miller of the Dealers Association, who says the entry list is more promising than ever before.

ZONING SYSTEM A SUCCESS

Chicago, Aug. 4—More than half of the available 267 spaces have been sold for the annual Business Exhibit to be held by the Automotive Equipment association in the Coliseum and Annex November 15-20. In distributing applications for space the association adopted the zoning method with great success, replies being received by telegram from cities in the same zone within six minutes of each other.

TRUCK TOUR BRINGS ANOTHER

Cincinnati, Aug. 2—The success of the recent truck demonstration tour through Southern Ohio and Northern Kentucky has caused the Cincinnati Motor Truck Dealers association to launch plans for a similar tour through the Blue Grass region of Kentucky, beginning August 30, and lasting probably one week.

Farm demonstrations will be made en-

route and it is expected that as many if not more motor trucks than were in the last tour will take part. In the June tour 28 towns were visited and a distance of 308 miles covered. Fifteen trucks were in line and it is estimated that 17,500 persons were reached by the speakers.

TO STAGE CAR SHOW AT FAIR

Danville, Ill., July 29—Dealers in automobiles, trucks and tractors of Vermillion County, Illinois, have voted to stage a show of their vehicles in connection with the annual Illinois-Indiana fair to be given the first week of September in Danville. The dealers of Vermillion county now have a flourishing organization and believe that the fall and spring shows are good advertising stunts and stimulants to business. Committees have been appointed to take charge of all the arrangements for the September exhibition.

NEW PLANT FOR FORDSONS

Kansas City, Aug. 3—The Ford Motor Co. will erect a million dollar tractor assembling plant here adjoining the present assembling works with a daily capacity of 100 Fordsons. It will have a floor space of 200,000 square feet and will employ 600 men. Construction will probably be finished within six months. Peter F. Minnock, manager of the present assembling plant, will be in charge of both the tractor and motor car operations.

EXPORTING CARS FROM SOUTH

Atlanta, Ga., July 29—One of the largest shipments of automobiles that has even been exported through a Southern port was recently shipped from the port of Mobile, the shipment including sixty-one cars manufactured by a Detroit concern and routed through Mobile to Rotterdam. Recently a large shipment of Toledo made cars was shipped to Rotterdam by way of Mobile. The routing of automobiles for export through South Atlantic and Gulf Coast ports is an innovation that evidences the growing importance of these ports and the development of their facilities the past two or three years. Heretofore, virtually all automobiles, exported from America went by way of New York, and it is only lately that Middle Western shippers have begun to realize the advantages to accrue from exporting through Southern ports. The cost of freightage is probably no greater because of the equalization of rates, and there is much less opportunity for shipments to become congested in the railroad yards, as is the case in Eastern ports. Several of the automobile manufacturers of the Middle West are taking advantage of these conditions and Southern ports are forging rapidly to the front in this respect.

NEBRASKA TRACTOR SHOW AUG. 5

Holdrege, Neb., Aug. 2—The third annual tractor demonstration will be held at Holdrege August 5, 6 and 7 under the direction of Professor Ivan D. Wood of the University of Nebraska.

Car Models Limited By Demand for Space at Show

New System Made Necessary at Indiana Exhibit—Preparations for Semi-Annual Event

INDIANAPOLIS, Aug. 2—The first steps toward the holding of the twenty-first semi-annual automobile show under the auspices of the Indianapolis Automobile Trade association in conjunction with the Indiana State Fair, September 6-11, were taken this week when notification was sent out by the Indiana State Board of Agriculture that all cars in storage at the Manufacturers building at the State Fair Grounds must be removed by August 15.

So great has become the demand for space that a new system of allotment is being considered by which no dealer will be permitted to exhibit more than one car of the same model. Heretofore dealers have, in some instances, shown three or more cars of the same model, varying only in color, upholstery or equipment.

The Manufacturers building was completed last year and was built with the express intention of giving a suitable place for the display of automobiles. As a result John Orman, who has been active manager of every automobile show ever held in Indianapolis with one exception, has a simplified task in providing for the housing of the exhibits and entertainment of the visitors. There will be plenty of rest rooms and music, features that have strongly appealed to automobile show visitors in the past.

JOLIET TRADE ON SLOW TIME

Joliet, July 30—The Joliet, Illinois Automobile Trade association, voted to ignore the daylight saving measure placed in effect in Chicago and neighboring cities. The opposition of the farmers led to the action. The Joliet dealers find the rural trade too important to offend, and, as the men who till the soil objected to the change in hours, it was thought best to respect their wishes in this particular.

SPARTANBURG SHOW AUG. 11

Spartanburg, S. C., Aug. 2—A tractor exhibit will be held here on August 11 and 12 under the direction of Agricultural Agent Ernest Carnes, committees already having been named and a program outlined. Much interest is being manifested and it is expected that several hundred farmers and dealers in farm implements will witness the demonstration.

AUTOMOBILE RACES AT FAIR

Santa Rosa, Calif., Aug. 2—Automobile racing will feature the closing days of the Sonoma County Fair, to be held here Aug. 23-29. The main event will be a fifty-mile contest, for purses aggregating \$2500. Cliff Durant and Ralph DePalma are among the entries for the main event, it is stated.

Shortage of Materials Is Slowing Down Body Building

Business in Indianapolis Is Quiet Though Construction of Sales Rooms Is Uninterrupted

INDIANAPOLIS, Aug. 2—The automobile business in Indianapolis is quiet. No help is being let off but none is being taken on. As near as can be learned new cars are being shipped out regularly from each of the manufacturing firms, as fast as they can be built. Shortage of materials is still being felt by the manufacturers, especially materials for making bodies.

Along automobile row, dealers frankly report a slowing down of sales. This applies also to the used car market which up to the present time was brisk.

Building of salesrooms for automobile dealers is going along without any interruption except for an occasional strike now and then. There are in the course of erection a \$300,000 building of Lexington Sales Co.; a three-story building to be occupied by the Dickey Motor Car Co., dealers in the King Eight, and the Welbon Automotive Co., distributors of the Chandler and Cleveland; another building that is to be occupied by the Boozer-Patterson Co., distributors of the Gardner and the Auburn, and the Hoosier Motor Sales Co., with the Stearns-Knight and the Columbia Six. Three new automobile salesrooms are also being erected but have not been leased. The E. W. Steinhart Co. has just started to build a four-story service station adjacent to its present salesrooms.

FORMER BUYER ARRESTED

Chicago, July 30—George T. Murphy, formerly buyer for the Western Rubber & Supply Co., Los Angeles, has been placed under arrest in Springfield, Ill., on a charge of having cashed valueless drafts, drawn against the Los Angeles company.

As outlined in a warning bulletin sent out by the Automotive Equipment association, Murphy's practice was to visit manufacturing houses in the Central West, place substantial orders for goods, presumed to be for the Western Rubber and then ask for an endorsement on a draft drawn against his former employer.

All told, it is estimated that he secured close to \$1000. Among those making complaint against him are: Albertson & Co., Sioux City, Ia.; Fulton Co., Milwaukee, \$200; Gemco Company, Milwaukee, \$300; Cooper Company, Marshalltown, Ia., \$200. He has not been with the Western Rubber & Supply Co. for about a month.

TIRE RECEIVER APPOINTED

Akron, O., Aug. 2—The State Savings & Trust Co., Akron, and Merchants National Bank, Massillon, were appointed by the Common Pleas Court receivers for the Biltwell Tire & Rubber Co., Barber-ton, near here, the appointment being

made on petition of Augustus Stuhldreher, stockholder and surety for \$10,000 of Biltwell debt, who claims the company is unable to pay \$50,000 "past due" and demanded by banks. The company agreed to the receivership "under present conditions" to safeguard the interests of the stockholders and creditors and to prevent judgments on several suits pending against it. Biltwell has capacity output of 5000 tires and tubes each daily. Authorized capital is \$2,350,000.

ADVOCATE MORE SALES FOR CASH

Philadelphia, July 29—It is reported here that beginning Aug. 1, several of the dealers in motor trucks in this city will shorten the period in which time sales may be made and increase the amount of the initial payment.

This step, it is said, will be taken because of the prevalent tightness of money and because the majority of truck dealers in this vicinity for some time have been convinced that it is generally healthier for the trade to make more sales for cash than has been the custom.

Some of the companies, it is understood, will raise the initial payment from the usual 20 to 25 per cent.

CROPS MAY RELIEVE SITUATION

Kansas City, Aug. 2—Dealers and bankers here are more optimistic concerning financial conditions as reports of record breaking crops in Kansas City's trade territory come in. The present wheat harvest has been estimated to exceed all previous yields and with ample money to care for the crop Kansas City leading bankers are cheerful.

Automobile dealers who have been laboring under the extraordinary credit restrictions in this district see prospects of relief and good business after the present harvest is moved. The freight car shortage is the disturbing factor both from the angle of car shipments and the tight credit conditions due to inability to move commodities. The agricultural loans of this district will be liquidated as the country demands the agricultural products congested here and thus free a large volume of credit for commercial needs. The great problem, according to J. W. Perry, president of the National Bank of Commerce, is to move the crops.

TRUCK MANUFACTURERS TO MEET

Chicago, Aug. 2—The Motor Truck Manufacturers Association will hold a convention at the Congress Hotel here on Aug. 11 to discuss informally various problems facing the members.

RATES OF INTEREST HURT TRADE

Milwaukee, Aug. 2—The present situation in the trade is caused not so much by the curtailment of credit as it is by the abnormally high rates of interest demanded by the banks. Some dealers are not yet caught up with orders and have generous requirements awaiting fulfillment, but, as a rule, passenger cars may now be purchased out of stock. Speaking broadly, the supply is more nearly equal to the demand than it has been in two or three years.

No Shut Down On Account Of Power Curtailment

Use of Night Shifts and Introduction of Gasoline Engines Keep Plants Running

DETROIT, Aug. 2—The order of the roit Edison Co., curtailing power 50 per cent because of failure of part of its turbine equipment, is not causing any factory shut downs or production curtailment of any serious extent. A slight reduction in output will be noticed during the next few days as a result of a rearrangement of schedules in many of the factories, which are compelled to put on night shifts in order to meet the 50 per cent schedule. Between the use of night shifts and the introduction of gasoline engine equipment for plant operation, it is confidently expected that the situation will be met without any noticeable curtailment of production.

The Hudson Motor Car Co. is putting a few of its machine departments on night shifts, as are also Cadillac and practically all of the large factories. Some of the smaller factories like the Zenith Carburetor Co., and others of like size, have divided their forces in half and are making two shifts per day instead of one. No labor trouble has been caused due to this condition, as the men have realized the situation is out of the hands of their employers and is simply a condition which can be met in no other way.

ASSN. APPOINTS SECRETARY

New Orleans, Aug. 4—James H. Duncan, for the last ten years an Arizona copper miner, has been named secretary-manager of the Louisiana-Mississippi Automotive Trades association, succeeding C. U. McDowell, under whose administration the organization was built up to its present strength in both states.

DISCOVER VULCANIZING PROCESS

Washington, Aug. 4—Discovery of a new process for vulcanizing rubber which will permit cold vulcanizing in garages and repair shops has been reported to the Department of Commerce here. English scientists claim the new process will affect the manufacture of tires and other equipment.

According to the findings of the Manchester College of Technology, it is possible to use two gases, sulphurated hydrogen and sulphur dioxide, which react on each other to produce water and free sulphur. In the English laboratories, the treatment of crude rubber either in solid form or in solution, with these gases, the production of sulphur vulcanizes the material. Rubber has been mixed with sawdust, leather scraps and even paper and successfully vulcanized. From these experiments, the investigators believe the uses will extend to the manufacture of artificial leather and linoleum. The cold vulcanizing will allow extensive use of coloring matter.

Want Rationing System To Keep Gas Price Down

**Refiners Would Have Quota Fixed
Based on Local Automotive
Activity**

WASHINGTON, July 30—Efforts to refining companies to obtain Government support to their proposed plan for rationing gasoline have been unavailing, principally because the Government has no authority for such action unless it is decreed an emergency exists. Representatives of the various oil interests have been in Washington for several days, endeavoring to enlist the support of Federal officials for the rationing system which refiners propose to enforce in every state and community, if possible. All Federal agencies have made it clear to the proponents of this plan that it would require a special act of Congress or a Presidential proclamation, both of which are improbable, to enable the Government to participate in any such scheme.

It was stated here to-day that T. A. Dines, vice-president of the Mid-West Refining Company, and C. G. Sheffield, of the Standard Oil Company of New Jersey, constituted the committee to represent refining companies. According to these officials, a rationing system must be enforced to curtail consumption and keep prices down. Refiners say they would depend upon the voluntary cooperation of dealers and consumers to make this plan effective. Judging from the statements of the committee, it is proposed to dole out a fixed quota to each dealer, based upon the number of licensed vehicles and other gasoline consuming engines in each territory.

Will Keep Price Below 40 Cents

Refiners anticipate formidable opposition on the part of automobile dealers throughout the country. They claim, however, that these dealers and others will soon recognize the advantage of their scheme, which is intended to keep the price of gasoline below 40 cents a gallon.

Statistics of refinery operations in May, compiled and issued to-day by the Bureau of Mines, shows an increase of 439,632 gallons over the daily rate of production during the preceding month of April. It is encouraging to note that the gasoline production for May is the highest on record, the daily average being 12,292,880 gallons. Domestic consumption continues to exceed production. The consumption during May increased 28 per cent more than April. That the seasonal demand for gasoline has made heavy inroads on available stocks is indicated by the report of a reduction of 65,880,849 gallons which was taken from the stocks. It was not until June, or two months later in the season, that the 1919 gasoline stocks started to decrease.

It is significant to note that exports of gasoline for May were 25,125,000 gallons larger than the preceding month. This

official statement apparently confirms the charges of California automobile dealers that exports were increasing while the domestic supply became alarmingly short. A reduction of 100 per cent in shipments of gasoline to insular possessions has been reported.

Lubricating oils, too, reached the highest point of production in May, with a daily average of 2,879,110 gallons. Lubricating stocks on May 31 were 136,000,000 gallons, or a decrease of 39,000,000 gallons since June, 1919. Exports of lubricating oils for the first five months of this year represented an increase of

Charles City, Iowa, Aug. 4—A train of refrigerator cars used for transportation of beer before the enactment of the eighteenth amendment was brought back into service recently through leasing it from a Milwaukee brewery and putting it into use to carry cement to Mason City manufacturing plants in connection with road building operations in Floyd county. The county has jumped to the lead in actual paving construction work in Iowa this season.

47 per cent over the corresponding period in 1919. Domestic consumption of lubricating oils for the first five months of 1920 was 39,000,000 gallons, or 21 per cent larger than in 1919.

OPPOSED TO CHANGE IN SYSTEM

Seattle, Aug. 2—Any attempt to disturb the equal rationing system of gasoline on the Pacific Coast will be vigorously opposed by Seattle civic organizations and automobile dealers. This was made known in a vigorous manner when Los Angeles interests intimated that they would renew their fight to hold gasoline produced in California for the benefit of the California tourist trade.

The gasoline shortage in Seattle and in other parts of the state of Washington continues acute, although it is not as bad as it was six weeks ago. The Shell company has announced another increase in its product, the new price being 20 cents a gallon throughout the Puget Sound district. Standard and Union Oil Company's gasoline remains at 24½ cents a gallon here and local offices of those companies said no price advance was anticipated.

TRUCKS MEET STRIKE EMERGENCY

New Orleans, Aug. 2—To meet the emergency caused by the recent street car strike, Frank & Weinberger, distributors of the Velie truck, put on a 5-ton truck and operated it on a regular schedule around the Tulane Belt, a distance of seven miles, and over the route followed by one of the best patronized street car lines in the city. No fare was charged for the accommodation.

SEVERIN ADVANCES PRICE

Kansas City, Aug. 2—The Severin Motor Co. announces that from Aug. 1 the price of the Severin will be increased from \$2400 to \$2550.

Fabric Tire Prices Slump Through Shifting Demand

**Overproduction and Other Factors
Result in Stocks Being Sold
At Cost**

NEW YORK, Aug. 3—Many of the tire dealers in the Metropolitan district are selling their fabric stocks at cost. This action is taken chiefly to get back the money tied up in a portion of their equipment which is not moving rapidly but is due partly to a professed belief that prices soon will go down. None of the manufacturers' representatives here will admit that a fall in prices is imminent but the report persists throughout the trade.

The bulk of the tire demand has shifted within a comparatively short time from fabric to cords. Factories were unable to shift their equipment quickly enough to meet the changing conditions. As a consequence there has been a large over-production of fabrics. The supplies on hand, under the conditions which prevailed a few months ago, would have been no more than adequate but there has been a heavy falling off in demand since that time.

Dealers stocked heavily with fabrics at the old prices, in anticipation of a lively spring demand. Then came a spring which offered few inducements for motoring. This was followed by a slackening in demand for cars, curtailed production and financial stringency which further shortened the call for tires. The dealers now are trying to turn over their money.

OAKLAND PRICE INCREASED

Pontiac, Mich., Aug. 2—Oakland Motor Car Co. has announced an increase in the price of the roadster and touring car from \$1235 to \$1395 and sedan and coupe prices of the sedan and coupe from \$1885 to \$2065.

DRIVEAWAYS DO DOUBLE DUTY

Cincinnati, O., July 31—Double duty is being performed by trucks of the Schacht Motor Truck Co. of Cincinnati which are being driven overland to dealers in the East.

The trucks, driven by men sent to Cincinnati by dealers in the East, are hauling large loads of Cincinnati products for Cincinnati manufacturers at express rates, thereby relieving to some extent the congestion on the railroads.

This service, Albert Staab, sales manager of the Schacht company, explains, is only temporary and will be discontinued when the overland delivery of the trucks is stopped. The goods are handled from loading to unloading, being delivered at the door of the Eastern consignees.

Most of the five-ton trucks leaving within the past week have carried loads to the East. Another truck load has just started. Small advertisements are being inserted in Cincinnati newspapers to call attention to this method of shipment.

Seek Adequate Information Concerning Rural Grades

National Research Council to Under- take Investigations on Old Na- tional Highway at Columbus

NEW YORK, Aug. 2—Investigations designed to determine economical grades on rural highways, will be undertaken by a special committee of the engineering division of the National Research council, headed by Prof. T. R. Agg, of Iowa State College, a highway engineer. The tests will be conducted on the old national highway near Columbus, O., and will begin September 1. The program for the tests follows:

Three-quarter ton trucks with pneumatic tires, September 1.

One ton trucks, one with pneumatic and one with solid tires, September 5.

Two ton trucks, one with solid and one with pneumatic tires, September 8.

Three and one-half ton trucks, equipped with both kinds of tires, September 12.

Five ton trucks with solid tires, September 15.

Highway engineers long have felt the need of more adequate information concerning grades, especially as they relate to the operation of motor trucks and the experiments which will be carried on at Columbus will be more thorough than any hitherto attempted.

The first problem to be undertaken is that of determining the effect of grades on motor trucks. The trucks to be used will be supplied by the motor truck committee of the National Automobile Chamber of Commerce. Except in the cases where trucks of the same size equipped with both kinds of tires are to be used, the vehicles will be identical in all other respects.

STATE FAIRS ATTRACT UTILITORS

Indianapolis, Aug. 2—Utilitors, a farm power unit, manufactured by the Midwest Engine Co., Indianapolis, will be displayed at several state fairs by the company and its distributors this fall. Twenty-five district and special representatives of the company are attending a sales convention at the plant this week. The men will be given additional instruction in handling the farm unit at the company's experimental farm of thirty acres near this city. Lon R. Smith, general sales manager of the company, will be in charge of the conference at which time distribution plans for the coming year will be formulated.

CAR SHORTAGE HINDERS ROADS

New Orleans, La., Aug. 2—Shortage of gondolas and flat cars on the railroads is slowing down road work in the South almost to a standstill, and seriously impeding the marketing of unusually heavy crops by motor truck, owing to long stretches of bad road having been unimproved, in the midst of otherwise passable highways. It is impossible to get

gravel, sand and shells for the construction of these roads as long as the car shortage exists, and the Motor League of Louisiana, with the Louisiana-Mississippi Automotive Trades association, has taken up the question of more cars with the railroads operating in Louisiana and Mississippi.

Virtually all the available gondola cars have been sent to the coal mines by the railroads, in an effort to avert a coal shortage this winter, by distributing the fuel now. Meanwhile, roads and motor-

Cleveland, July 31—According to the present outlook, there will be no automobile show in Cleveland, this being the first break in years in the automobile show schedule in this city. The difficulty is in securing a building. For the only building available, the owner demands a rent of \$50,000 for a week and the association at a meeting yesterday decided that it would do without the show rather than pay this amount. As an alternative it is planned that dealers will decorate their salesrooms and hold an automobile display week on motor row in place of the customary exhibition.

ists, crops and trucks must wait, as there is little prospect that the efforts of the two associations will accomplish anything.

NAME TRACTOR SHOW MANAGER

Columbus, O., Aug. 2—Plans for the National Tractor Show which will be held here Feb. 7 to 12 under the auspices of the National Implement & Vehicle Manufacturers' association in conjunction with the Columbus Tractor & Implement club are fast being brought to a head. The local committee, consisting of W. J. Longbon, chairman; W. A. Hood, J. H. Choquill, C. C. Gorsse and G. O. Thornburg, is now sending out contracts to prospective exhibitors. The show will be held on the Ohio State Fair Grounds.

The special committee of the National Implement & Vehicle Manufacturers' association, which will co-operate with the Columbus club, will be in Columbus soon to arrange many of the details. This committee consists of E. J. Gittins, vice president and general manager of the J. I. Case Co.; Judge Everson, general trade manager of the International Harvester Co., and President Brantingham of the Emerson-Brantingham Co.

W. W. Whaley of Springfield, O., has been made general manager of the show.

PIERCE-ARROW HOLDS MEET

Buffalo, July 30—Three hundred Pierce-Arrow truck dealers from half a dozen countries attended a sales convention here July 19 to 21. The dealers were guests of the company and were welcomed by President George W. Mixer.

Gaston Chevrolet Winner At Columbus Sweepstakes

Shatters Records at Triangular Race Meet, Maintaining Lead from Start to Finish

COLUMBUS, Aug. 2—Gaston Chevrolet in his Frontenac, with which he won the 500-mile sweepstakes at Indianapolis in 1920, was the winner in the triangular race meet at the Columbus Driving park yesterday. The race meet was between Chevrolet, Tommy Milton in his Duesenberg and Ralph Mulford in his Monroe. Records were shattered at the race. The 100 miles was negotiated in 1 hour, 29 min. and 23 sec., which is just 2 min. and 7 sec. less than the world's dirt track record made by Tom Alley at Minneapolis, July 4, 1914.

Chevrolet drove such a steady race that records for every 10 miles were smashed. At no time was Chevrolet in danger of losing the lead. Milton, who was the only other contestant to finish was lapped four times during the contest and was more than four miles in the rear when Chevrolet crossed the tape.

Jinx Gets Mulford

Mulford was in tough luck as a piston broke when the first half lap was covered and he limped back to the pits. He could not re-enter the race as no replacement parts were on hand and he was compelled to see the other two contestants fight for the title of champion of dirt track racing.

Fully 18,000 people witnessed the contest which was under the auspices of the Columbus Automobile club. Sanction was secured from the A. A. A. and it was the plan to settle the championship of the three racing kings. The start was paced by Barney Oldfield who came down from Cleveland to witness the affair. The start was made twice as Mulford had tire trouble on the first lap and the other two drivers were called back for another start.

No trouble of any kind either tire or engine occurred on the cars of Chevrolet or Milton. It was a steady grind from the start with Chevrolet leading at every lap. The prize of \$250 given for the first lap was won by Chevrolet as was the \$100 prize for the winner of each 10 miles. Thus Chevrolet was the winner of \$11,150 as the main purse was \$10,000 all for the winner.

Milton made an exhibition mile previous to the start of the main event in 50 sec. flat which was one of the fastest miles ever driven on the track.

SAMPSON BRANCH IN MEMPHIS

Memphis, Tenn., July 29—Announcement is made by the officials of the Chamber of Commerce that the Sampson Tractor Co., of Janesville, Wis., a subsidiary of the General Motors Co., is planning to build a thoroughly modern structure in this city. The new building will be 70 ft. by 200 ft. Construction is expected to begin immediately.

Alabama Dealers Discuss Service, Credit and Selling at Two-Day Convention

Emphasize Need of Greater Accuracy By Dealers In Drawing Up Financial Statements. Service Must Be Better Organized to Meet Coming Competition

MOBILE, Ala., Aug. 2—Loose business methods revolving principally around inaccuracies in drawing up financial statements by the average motor car dealer are largely responsible for the attitude of banks and financing companies toward dealers who conduct their business in such fashion, according to James A. Fortier, president of the Commercial Credit Co., New Orleans, who spoke on the subject of automobile financing at the eleventh semi-annual convention of the Alabama Automobile Dealers Association which has just closed a two days session here.

The need for better business ethics, closer contact among dealers, the extreme value of association work and the general good that comes from the intermingling of business sessions and pleasure were among the salient thoughts the 160 dealers present carried away with them. Not a dealer—and Alabama has some very successful motor car dealers—went home but felt he had learned at least one valuable thing that would help him in his business. And when you can get a convention to do that it has not fallen short of its mark as a successful affair. Take bank credits for example. Not a dealer who was here but was glad to learn more about the situation. In addition to financial matters, advertising, merchandising, service, highways and other items of interest to the association were discussed.

Talks by Prominent Men

All meetings were held in the auditorium of the Battle House with the exception of the business session which was held at the Colonial Inn at Fairhope. This session was carried over from the first day inasmuch as Monday afternoon was given over to two talks, one by A. K. Kroh, of the Goodyear Tire & Rubber Co., Akron, and the other by Harry G. Moock, general manager of the N. A. D. A.

After the invocation on Monday an address of welcome was made by Harry Pillans, mayor of Mobile, who told briefly what the motor car has done for the state in joining up localities, stimulating interest in the building of better roads and causing the populace to take a new lease on life. Isham J. Dorsey, Ford dealer of Opelika, responded and was followed by James H. Duncan, newly elected secretary and general manager of the Louisiana-Mississippi Automotive Trade Association, who spoke on the activities of the organization, in the absence of George D. Wray, the president, and extended the dealers a welcome to the meeting of the association at Gulfport, Ia., in October.

Mr. Fortier, aside from speaking on financing, took up the subject of good roads and placed special stress on associations like the one he was addressing to see to it that roads of lasting quality are built and that there be better co-operation between truck makers, dealers and road makers in determining what sort of roads shall be built. His views on the gasoline and fuel situation in general coincided with those which have appeared at various times in this publication. He offered a suggestion that the dealers could be instrumental in teaching their customers fuel economy.

No Saturation in Sight

As for saturation he stated the financing companies do not look for a saturation point in the automotive industry for a long period and not then if things are handled right. The point of saturation is still very far off, he contended, especially when it is considered that there is a potential demand for about two million cars every year on account of old cars being junked.

In speaking on Alabama highway improvement, W. S. Keller stated that at the present time the greatest problem confronting the roads building problem in the state is the co-ordinating of roads so that each county will get the maximum benefit from the building of a road

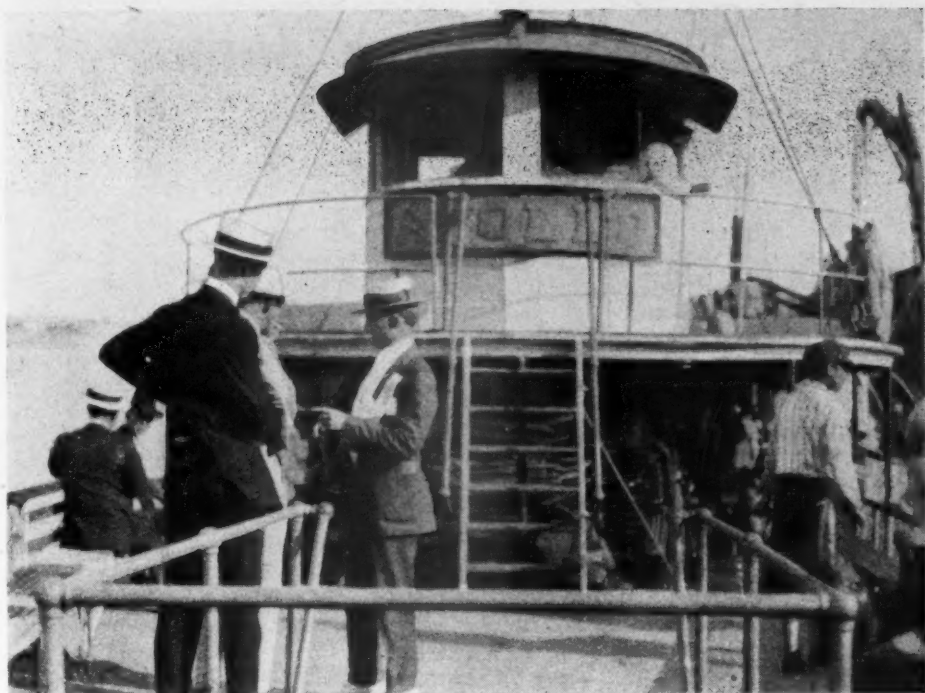
through it. The difficulty is that one county may want a north and south road which would be of most benefit while an adjacent county may require an east and west road. He believed the solution would be worked out by assistance from the Government and a system of roads built to benefit the state as a whole rather than satisfy individual counties. He urged the dealers to take active interest in the road building program and stated they could be of great assistance in working with the highway department when it came to determining the load capacities of trucks likely to be sent over such highways. There evidently is a need for closer working between road builders and the makers of commercial vehicles.

The Better Dealer Survives

Probably the chief thought coming out of the talk by J. O. Mann, Toledo, on Advice On Dealer Advertising was that if the saturation point is reached it will mean more cars, more profit and less competition to the preferred dealer. This is not difficult to understand when one realizes that with practically every industry there is a gradual thinning out in the number of concerns engaged. Take watches for instance. In 1869 there were thirty-seven watch making concerns turning out annually close to three-million watches. In 1919 we had



Some of the notables at the convention. Left to right, James Fortier, H. A. Drennen, B. L. Malone, L. G. Adams, Harry Moock, J. O. Munn and A. R. Kroh



The steamboat Apollo about to leave the dock at Mobile with some one hundred and fifty Alabama dealers bound for Fairhope for the second day's sport

fifteen concerns making over fourteen million watches.

Better Merchandising and Salesmanship In the Automobile Industry was the subject of the talk given by B. M. Ikert, Editor *MOTOR AGE*. The speaker pointed out that the era of order taking is about over and soon dealers will have to get out and hustle to sell cars if they are going to survive in business. The time to start organizing for the period of intensive merchandising of automotive products is now. The man who is not in position to buy a car must be told "No", and it is up to the dealer and his organization to go out and find the people who can and should have cars or trucks.

Service Must Be Right

Dealers must put forth the same hard work in their business as enthusiastically as they did at Fairhope where they walked nearly a mile in the hot sun just to play and watch a game of baseball. Mr. Ikert concluded his talk with a discussion of service methods and stated this vital phase of the dealer's business must be better organized, as the time is coming when most of our cars will be sold from the back door of the dealer's place of business. In other words, people will buy cars from the dealer whose service is right. The speaker also touched briefly on the value of association work.

Farmers Present Big Sales Field

After luncheon on Monday A. R. Kroh injected considerable enthusiasm into the meeting by pointing out the vast possibilities of every automotive dealer in the motor truck, the tractor and the farm light plant for farmers. He stated that dealers too often are content with their city trade only, forgetting all about the farmer, who not only wants to buy a car, but everything else that goes to motorize his place. He spoke of the great work

being accomplished by truck tours, put on by dealers in various parts of the country. Trucks cannot be sold in a showroom one-half as effectively as when driven out to a farmer and made to haul some of his own farm products. You must talk the farmer's language and show him just where the truck fits his farm and conditions. The same is true of the tractor and to a lesser extent is true of the passenger car.

The last speaker was Harry G. Moock who in his usual convincing style "told the dealers where they would get off at" if they did not put into practice the code of ethics governing a well-regulated motor car business. It was his thought that the next few years would see fewer faces in the automotive industry. The present attitude of the bankers regarding the dealers he said ultimately would prove of benefit in that it would result in the "weeding out" of the undesirables, leaving the legitimate dealer in business.

N. A. D. A. Gains Members

Mr. Moock traced the development of the N. A. D. A. since its inception to the present time and proved conclusively to the assembled dealers that the association had done many remarkable things for the industry and dealers. His talk was so convincing that before the convention had adjourned on Tuesday the membership list of the N. A. D. A. had been swelled considerably. The Alabama dealers have appointed a committee whose efforts will be directed towards getting every dealer in Alabama enrolled in the N. A. D. A. The state now has some sixty members.

Albany, Ala., Next Meet

Albany, Ala., was chosen as the next meeting place of the association, the date being January 24, the invitation being extended by B. L. Malone, who not long

ago staged an automobile show in that city which drew something like seventy-five thousand people, although the town has a population of seventy-five hundred.

At noon Tuesday an old-fashioned barbecue dinner was served on the beach to the dealers and their friends. Dancing, surf bathing and fishing filled out the time of the convention's final day.

That the convention was such a huge success, and congratulations are in order for the excellent manner in which it was handled, largely is due to the efforts of L. G. Adams, president of the association, who acted as chairman on both days.

MOORE COMPANY IN DIFFICULTIES

Danville, Ill., Aug. 2.—Upon a petition filed by five stockholders of Indiana, Judge English in the Federal court here has issued a temporary restraining order against the officers of the Moore Vehicle Co., Danville, and the Moore Motor Vehicle Co. of South Dakota. Arguments for the appointment of a receiver and a permanent injunction will come up later. James H. Elliott of Danville has been appointed temporary receiver and has taken charge of the plant at Tilton.

Various charges are made against the companies, among them being that of insolvency. The officers deny these charges.

It has been hoped that the Marwin Truck Co. of Kenosha would purchase the plant.

TO STAGE USED CAR SHOW

Indianapolis, Aug. 2.—The Indianapolis Automobile Trade association is contemplating the staging of a used car show immediately following the state fair show, Sept. 6-11. There has never been a used car show in Indianapolis and the directors of the association feel that one could be held following the regular show at small expense, as the decorations, signs, etc., used in the regular show would be used to set off the used car display without any added expense.

RESURFACING UNIONTOWN TRACK

Philadelphia, Aug. 2.—Because of the alleged unsafe condition of the Uniontown, Pa., speedway, owing to weather and high speed, the management plans to have an entire new surface constructed before the fall meet, in September.

Despite repairs made before the recent races, the terrific speed tore great gaps in the track at various points.

STINSON TRACTOR BUILDING

Superior, Wis., Aug. 2.—The Stinson Tractor Co. of Minneapolis, conducting its main assembling plant in Superior, Wis., is building an addition to the plant to increase the capacity about 40 per cent. The Stinson company intended to begin work last spring on the construction and equipment of a main works at Eau Claire, Wis., where all production and the general offices will eventually be concentrated. The building project, however, has been deferred because of conditions in the labor and material field.

New Stanwood Six

An Assembled Job of Standard Parts Throughout. Five-Passenger Touring Sells For \$2050

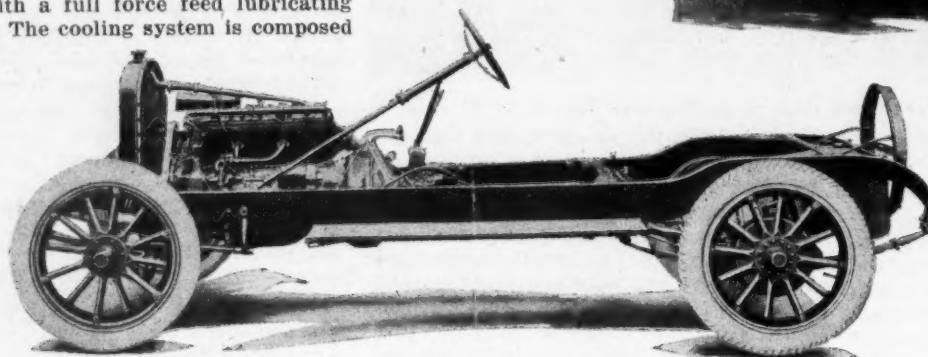
THE Stanwood Six is a new entry in the automotive field, a car of medium size and weight composed of standard parts throughout. There are no startling features of body design, but approved modern lines have been carried out. A Continental engine, Borg and Beck clutch and Grant-Lees transmission make up the unit power plant. Power is transmitted through the propeller shaft to the Standard Parts rear axle, semi-floating, equipped with Bock roller bearings and a pressed steel housing. The drive is of the Hotchkiss type.

The engine used in the Stanwood Six is a Continental model 7-R, with a $3\frac{1}{4}$ by $4\frac{1}{2}$ in. bore and stroke, which is provided with a full force feed lubricating system. The cooling system is composed

Front view of the new Stanwood Six five passenger touring car. This is the only model which will be built at present. This car weighs 2900 lbs. and has a speed range of 1 to 60 miles an hour



Chassis of the Stanwood Six. A Continental engine is used. The frame is pressed steel made up of $7\frac{1}{4}$ in. channel section with 2 in. flanges. Perfection springs are specified



of a centrifugal water pump and a radiator of the honeycomb type. The fuel system is made up of Steward-Warner vacuum feed, a 20-gallon tank in the rear and a Stromberg carbureter. Atwater Kent ignition is used.

The wheelbase of the Stanwood is 118 in. The frame is pressed steel made up of a $7\frac{1}{4}$ in. channel section with 2 in. flanges. The chassis is supported on Perfection springs measuring 38 in. for the front and 57 in. for the rear, the leaves of the springs being 2 in. in width. The chassis lubrication is accomplished by the Alemite system. The brake construction affords a straight pull with no jumping of the brake pedal from the action of the axle on the rear springs. The framework of the body is of heavy and very substantial construction. The radiator shell, fenders and splash pan are black enameled and the body is fin-

ished in Brewster green, upholstered in genuine grain leather.

This car weighs 2900 lbs. and has a speed range of from 1 to 60 miles per hour on high gear. The Stanwood Motor Car Co., St. Louis, is building but one model at present, a five passenger touring car that sells for \$2,050.

NEED BAD CHECK PREVENTIVE

Kansas City, Aug. 3—Tendering worthless checks by automobile owners to dealers, garagemen and service men has become an epidemic in this city, some dealers having received more than ten checks during the past month which have come back to them from the banks

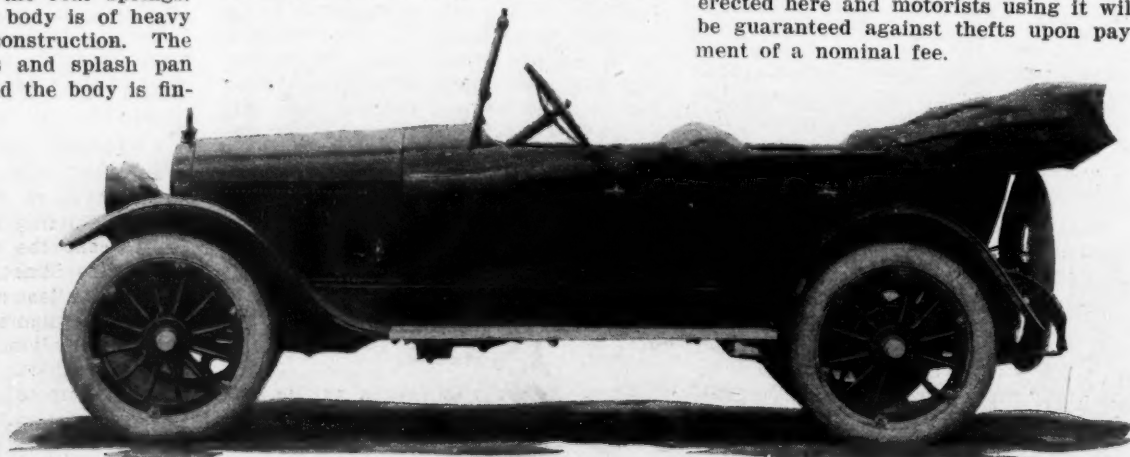
bearing the stamp "not sufficient funds."

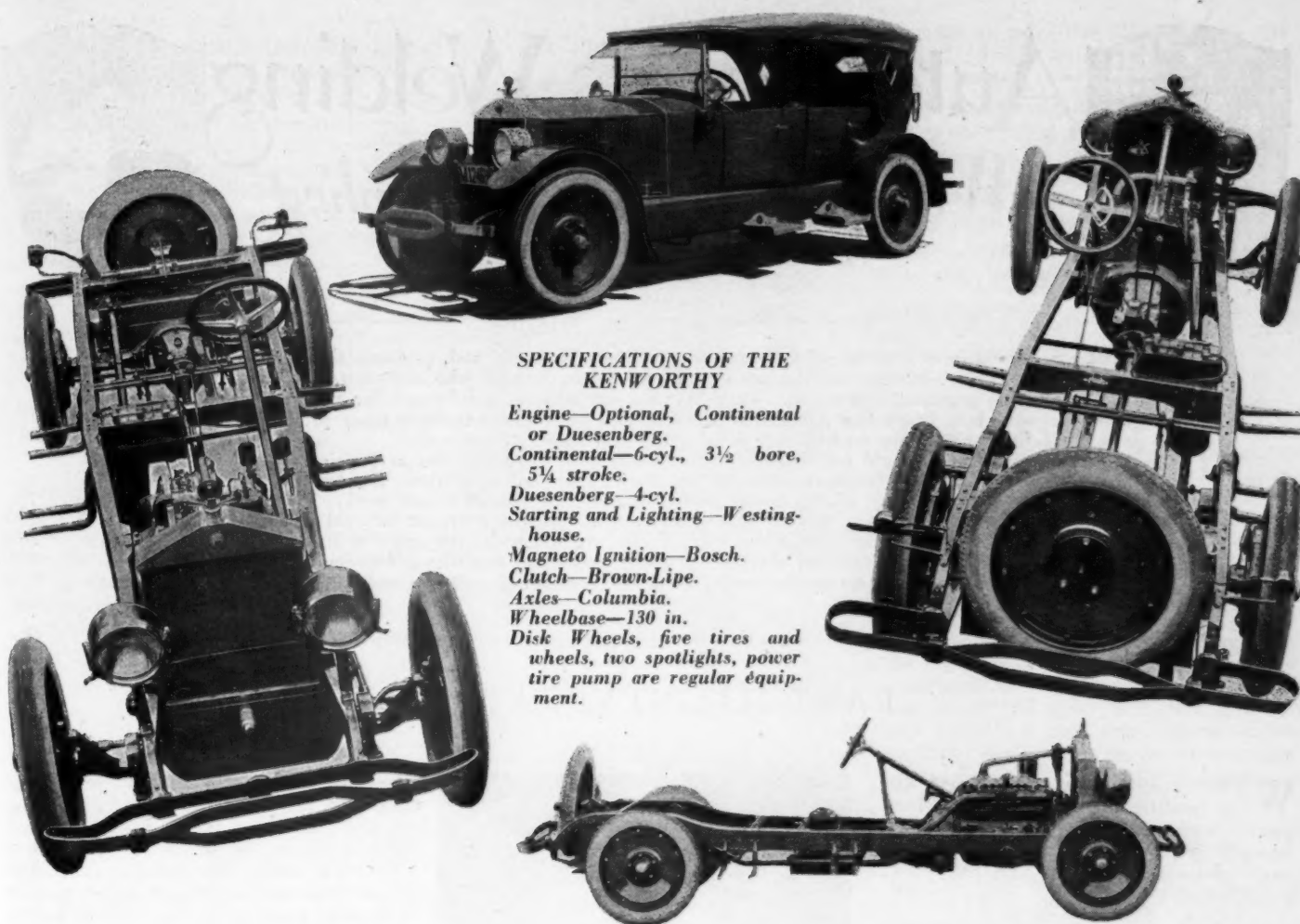
The garage owners have no organization here to which they can turn for credit information to assist in checking up the passing of worthless checks. Garage men believe that measures must be taken and that a credit organization will be of great assistance. The Retail Credit Men's association of Kansas City is prepared to render the assistance needed by the garage men.

PARKING SHED TO FOIL THIEVES

Spartanburg, S. C., Aug. 2—As an outgrowth of an epidemic of automobile thefts, a parking shed with a housing capacity of two hundred cars will be erected here and motorists using it will be guaranteed against thefts upon payment of a nominal fee.

Side view of the new Stanwood Six five passenger touring car. The body is finished in Brewster green, upholstered in genuine grain leather. Wheelbase is 118 in.





SPECIFICATIONS OF THE KENWORTHY

Engine—Optional, Continental or Duesenberg.
 Continental—6-cyl., 3½ bore, 5¼ stroke.
 Duesenberg—4-cyl.
 Starting and Lighting—Westinghouse.
 Magneto Ignition—Bosch.
 Clutch—Brown-Lipe.
 Axles—Columbia.
 Wheelbase—130 in.
 Disk Wheels, five tires and wheels, two spotlights, power tire pump are regular equipment.

Some Views of the Kenworthy

Is a Quality Product Throughout and Resembles the English Rolls-Royce

THE Kenworthy car which was announced in the Show Issue of MOTOR AGE has now reached a steady rate of quantity production. The car is a quality product through and through and bears a certain resemblance to its higher priced English contemporary, the Rolls-Royce. The car is constructed of well known units and fashioned in a very sturdy manner. Its wheelbase of 130 in. together with its long semi-elliptic springs give it good road ability. The Kenworthy car is supplied with two power plants, either being optional, the Continental engine and the Duesenberg.

Duesenberg Engine a Four

The former is the six cylinder job of 3½ by 5¼ in. bore and stroke and the Duesenberg is a four cylinder top side valve job. The clutch is a dry disk multiple type of Brown-Lipe make. In the case of the Continental engine equipment, a three speed Brown-Lipe transmission is used and with the Duesenberg engine, a four speed Brown-Lipe transmission is used. From the transmission the power is transmitted through Thermoid-Hardy disk joints of large capacity.

These are relieved of all strain except that of turning the propeller shaft. The

front and rear axles are Columbia make and the ratio of the bevel gear is 4 1/10 to 1. The rear axle is semi-floating type.

The long, flat, semi-elliptic rear spring takes no driving or braking strain. A large and sturdy radius rod is supplied to absorb these strains. The frame is a very heavy section being 7 in. deep, and of 5/32 in. thickness stock. The aprons cling very closely to the frame side and round off at the bottom for no running boards are employed, there

being used in their place aluminum step plates.

The electric system of the Kenworthy is Westinghouse for the starting and lighting, with Bosch magneto ignition.

An Exide battery of exceptionally large capacity being 140 ampere hr. is used. The steering gear is of Ross make. Standard equipment of the Kenworthy includes, two spotlights, disk wheels with five tires and wheels, complete tool equipment, and power tire pump.

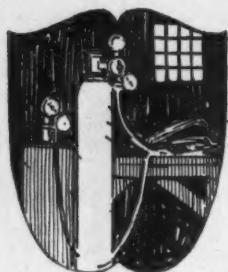
Ranger Four To Be Placed On Market In September

Endurance Test by Southern Motor Manufacturing Association Will Mark Its Debut

THE Ranger four-passenger car will make its appearance on the market the latter part of September, according to announcement by the Southern Motor Manufacturing Association, Ltd., Houston, Texas, which already is marketing Ranger trucks, tractors, trailers and commercial bodies.

In connection with the debut of this new model, the Ranger road race, a 3500-mile endurance test, will be held with a big purse as the prize. The race will be in the form of a tour of the southern states, starting and ending at Houston. Two Ranger cars will make the run, one going from Houston via San Antonio, Austin, Dallas, Oklahoma City, Little Rock, Memphis, Nashville, Chattanooga, Atlanta, Montgomery, Jackson, Baton Rouge, and New Orleans, back to Houston. The other car will cover the same route in the reverse direction.

Southern Motors has received approximately 1400 applications from southern drivers who wish to drive the cars.



Autogenous Welding

What it is and how it is applied



THIS is the third of a series of articles on autogenous welding and explains the function of the generator. These articles are intended to be of aid to the man who must learn the art of welding with little or no personal instruction. They also are intended as a reference for the man attending a welding school. It is likely that during the first few months of his instruction many problems will come up that may be solved more readily with these articles on hand.

Finally, this series should be of benefit to any automotive service man or repairman, even though he never intends to have a welding torch in the shop. The reading of these articles will give him an understanding of the subject which should greatly aid him in general repair work. He will be better able to decide, when he has a part to repair, whether it is feasible or not to weld it, and if so, if it will pay. The more familiar one becomes with this art, the wider the scope of its application. The man who is versed in the art will find many clever applications that one who is less familiar with the subject would never dream of. An understanding of welding principles offers a new technique to the automotive repairman.

PART III—GENERATORS

WHERE more than two torches are in continuous use an acetylene generator is recommended as a more economical source of supply than the more common acetylene tank, Figs. 7, 8, 9 and 10.

Acetylene gas is produced by bringing calcium carbide into contact with water, the ensuing reaction between the carbide and the water producing acetylene.

There are two general types: one in which the carbide is dropped into the water and the other in which the water is dropped into the carbide. The former is usually considered more satisfactory.

In selecting a generator the following specifications are of interest:

1—It should be so designed that a uniform generation of gas is obtained.

2—The mechanism for feeding the carbide to the water must be so arranged that it will proceed uniformly and regularly.

3—The feeding device must be accurately controlled. It must both stop and start at the proper points in the cycle of gas production.

4—The various valves and levers for refilling the generator should be so interlocked that errors in operating them will be prevented.

5—The generator should be protected from an internal reverse flow of gas or air by means of a hydraulic by-pass or back pressure valve.

6—The generator must be equipped with a suitable relief valve or venting device, so that if any excess of gas is produced it will be vented in the air.

7—The generator should be so constructed that the necessary quantity of

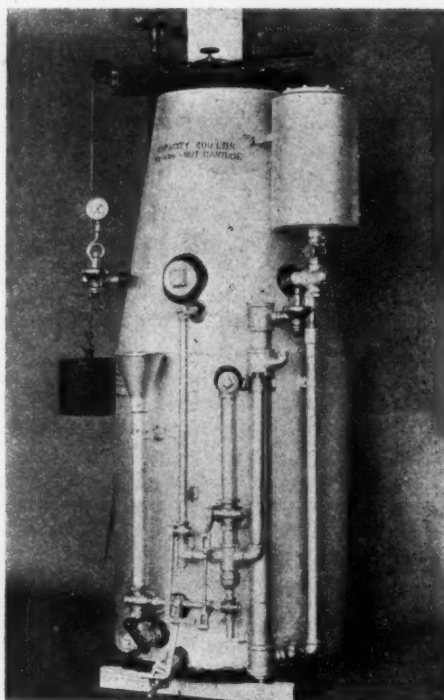


Fig. 7—A medium pressure acetylene generator with a capacity of 200 lbs. of carbide

gas will be produced without undue heat.

Since the carbide to water generator has proved the most satisfactory and the one most generally used, this type will be described. There are two divisions in this class, the low pressure and the medium pressure.

The low pressure generator is one which produces acetylene at a pressure of less than 1 lb. Because of this low

pressure it is possible to utilize a gasometer in the operation of the generator. In the particular type shown, the carbide is fed to the water by means of a revolving disk. Surrounding the disk are little plows or scrapers which pull off a certain quantity of the carbide as the disk revolves. The disk is rotated by a weight motor. This motor is controlled by a governor that is operated by the gasometer. When the gasometer reaches a predetermined height, the motor is automatically stopped. When the gas bell recedes, the motor is automatically started. The gas passes from the generator chamber into the gasometer and from thence to the filter where impurities are removed. Then it goes through the hydraulic back pressure valve which is a seal for the reverse flow of gas or air. Then the gas passes to the torches.

Due to the presence of the gasometer, the pressure of the gas remains constant. No regulating or reducing device is necessary since the same acetylene pressure is employed throughout.

An injector type blowpipe must be used with this generator in order that the required high velocity of the oxygen and the acetylene mixture be maintained.

A small hydraulic back pressure valve is used at each blowpipe outlet to serve as an additional seal against a reverse flow of gas.

PRECAUTIONS IN HANDLING GENERATOR

The generator manufacturer should supply detailed instructions as to its care and maintenance. These should be posted in a permanent place near the generator and should be strictly adhered to in setting up, starting and refilling.

As far as practicable all charging, cleaning, adjusting and manipulating should be done in the daylight.

The introduction of air into the generator should be avoided. An opening into the machine should not be left open a moment longer than necessary and two openings should never be uncovered at the same time, such as the carbide charging door and the sludge valve.

The generator should be kept full of water at all times, even when not in use. When the sludge is drawn off and the machine is flushed out, the next step is to refill it as specified by the instructions.

DO NOT EXPERIMENT

The water should be renewed in the generating chamber each time carbide is placed in the hopper. Never run more than one charge of carbide into the generating chamber without refilling with fresh water.

If water in any chamber of the generator should freeze, do not attempt to thaw it out with anything but hot water;

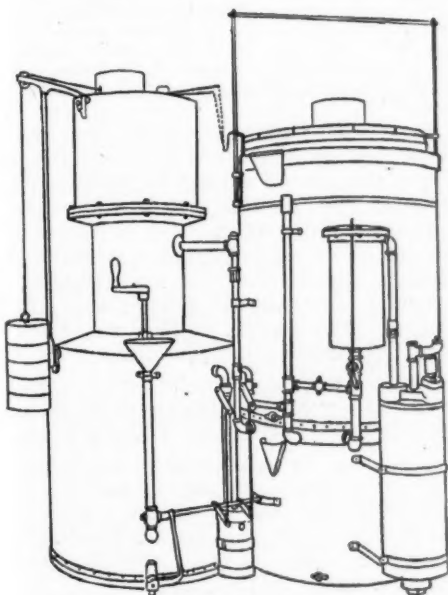


Fig. 8—The low pressure generator is one that produces acetylene at a pressure of less than 1 lb. Because of this low pressure it is possible to use a gasometer similar to a city gas tank in principle. In the generator shown, the carbide is fed to the water by means of a revolving disk surrounding which are little plows or scrapers that pull off the carbide and allow it to fall into the water. This disk is revolved by a weight motor. When the gasometer reaches a certain height the motor is stopped and when the gas bell drops a certain amount it starts again. The gas is passed through a filter where impurities are removed and then through a hydraulic back pressure valve which is a seal for the reverse flow of gas or air. An injector type blowpipe must be used with this generator. A small hydraulic back pressure valve is used at each blowpipe outlet to serve as an additional seal against a reverse flow of gas.

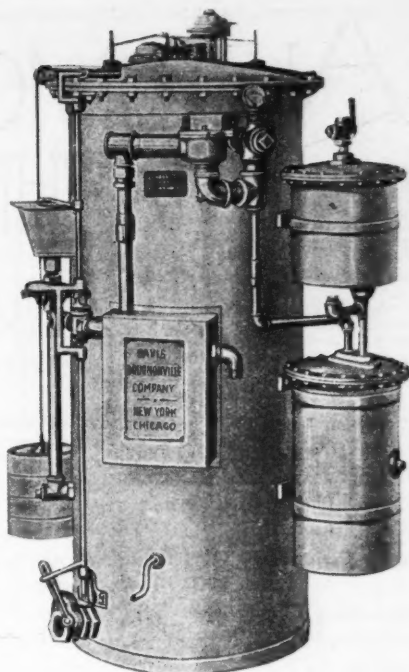


Fig. 9—Generator designed to furnish acetylene at medium pressure

and then examine the generator carefully for any damage which the freezing may have caused.

If the generator should require repair: First remove all carbide; second, drain all water from the generating chamber, then refill it as if for recharging; third, disconnect generator from piping and remove it to the open air. Then fill all the compartments with water and thus force out all mixtures of gas and air before applying soldering irons or any tools which might cause a spark.

In operating a medium pressure generator see that the pressure of the acetylene generator is properly adjusted; it should not exceed 12 lbs. maximum and the feeding motor should operate at about 10 or 11 lbs.

The operator should examine the flashback cylinder on the generator every week to see that the water is at the proper height, as shown by the instructions which accompany the generator.

Do not make any change in any of the safety devices on the generator or prevent them from functioning in any way.

In Next Week's Issue CONNECTING UP THE EQUIPMENT

will be taken up and the proper procedure described.

These articles on Welding are vital to the service business of the automotive dealer. The scarcity in parts which is now existent can be helped out by the rehabilitation of the old parts and in the case of broken parts, Welding is an important factor.

They are all put there for a purpose and even if you do not know why, do not take a chance.

Generators are made in various capacities usually from 15 lbs. up. A typical line produced by one manufacturer consisting of generators of the following carbide capacities: 15, 25, 50, 100, 200 and 300 lbs. of carbide.

The smaller size is designed for portable use and for small shops.

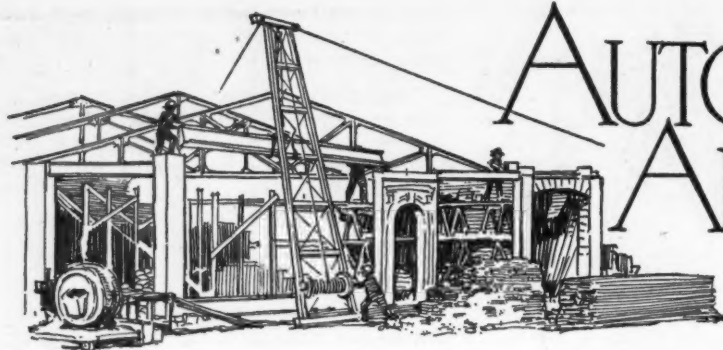
The generators of 50 and 100-lb. capacity are standard for general repair shops and for light manufacturing while the larger sizes provide for more extensive and continuous use in large repair shops and factories.

The demand on the generator should not be too great; not more than one cubic foot of acetylene per pound of carbide per hour with the carbide to water type and one half this rate for the reverse type.

This rule means that with a generator with 100-lb. carbide capacity it should not be called upon to deliver more than 100 cu. ft. of gas per hour. To use the acetylene at a higher rate will cause heating of the generator when the gas will break up into other gases which although combustible do not give as hot nor as satisfactory a welding flame.



Fig. 10—This generator delivers acetylene at medium pressure. Like all American generators now in use it feeds the carbide into the water, the rate of feed being controlled automatically by the consumption of gas at the torch. The generation ceases automatically when the torch is extinguished and begins again when it is lighted. The feeding is done by a simple vibrator working on the dash pot principle, and the pressure in the generator is controlled by the tension of a spring in a diaphragm governor. A safety blowoff valve limits the possible pressure to 15 lbs.



AUTOMOTIVE ARCHITECTURE

Planning and Building Problems

CONDUCTED BY TOM WILDER



No. 251

NARROW SERVICE BUILDING ON INSIDE LOT

We desire to erect a three-story building, consisting of a basement and two stories above ground on a 52 by 208 ft. lot, which is located in the middle of a block. The basement is to be constructed of concrete and the other two stories of brick. The building is to cover the entire lot, the only available entrance being from the front. The first floor will be divided into an up-to-date showroom, three offices, a ladies' restroom and a stockroom, the latter being behind the offices. The shop will be on the second floor. It is also our plan to install an elevator.—Carolina Auto Co., Inc., Columbia, S. C.

The only poor feature of this lot is its inside location and this appears to us to be quite a serious one. If there is no open space around the building that will permit the placing of windows in order to light and ventilate the section from the general offices to the rear end, both will have to be done artificially. Unless, for other reasons, this lot is a very desirable location, it would be better in the long run to try to get one with more natural advantages. This lot should be used exclusively for a storage garage and for which purpose it is admirably fitted.

We rather like the layout, but there is a tremendous amount of waste space in the long passage and no way to avoid it. The passage is necessary and being so long, it must be wide enough for cars to pass or cause trouble. Aside from the artificial light standpoint, the office arrangement is much above the average. A stairway leads directly to the used car salesroom on the second floor, making it convenient in showing cars to customers.

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and readers are urged in asking for such plans to be used to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

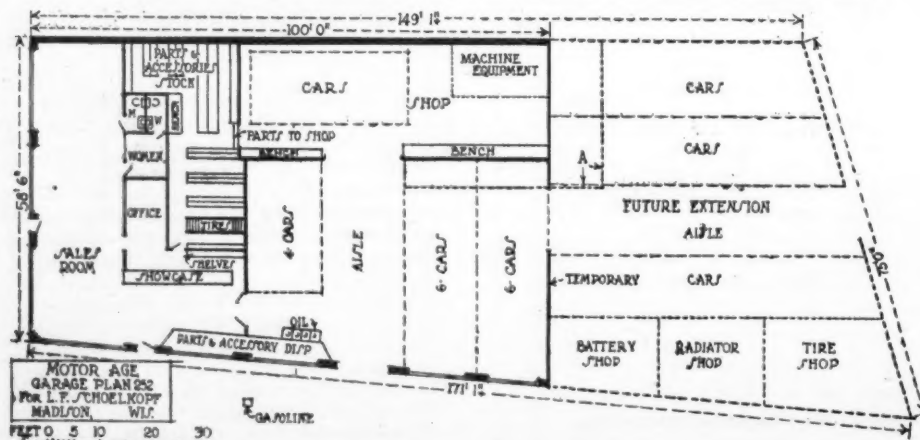
Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

The display room is ample and well proportioned.

The location of the elevator is the best that we can discover for this type of building. The location at A is preferred by many, because it can be entered from both sides. However, considerable space must be kept free if this location is adopted, so it would seem much better to use the location we have selected. This location will also prove much better for the basement and second floors.



No. 252—Ford sales and service station with provision for enlarging

No. 252

FORD SALES AND SERVICE WITH PROVISION FOR ENLARGING

We are contemplating the construction of a Ford sales and service building on a lot which faces on three streets. We plan on making the building 100 ft. in length this year and later, as the business expands, to occupying the full 171 ft. length of lot. We wish to have besides the salesroom—a repair shop, garage and storage space and a parts and accessories stockroom or store. This is to be simply a one-story building, so we will not go into detail concerning relative size of the different sections, as we assume that you are very familiar with the Ford Motor Co.'s requirements for a building handling a 100-car contract.—L. F. Schoelkopf, Madison, Wis.

We have made the showroom and stockroom sections of this plan a little larger than would usually be the case in a building of this size, but with the contemplated enlargement, the proportion will be about right without rearranging. If these departments were made smaller, it would not affect the storage space to any appreciable extent, unless they were made too small to be practical.

The vacant part of the lot may be used to an advantage by utilizing it to store the overflow when all your space is filled.

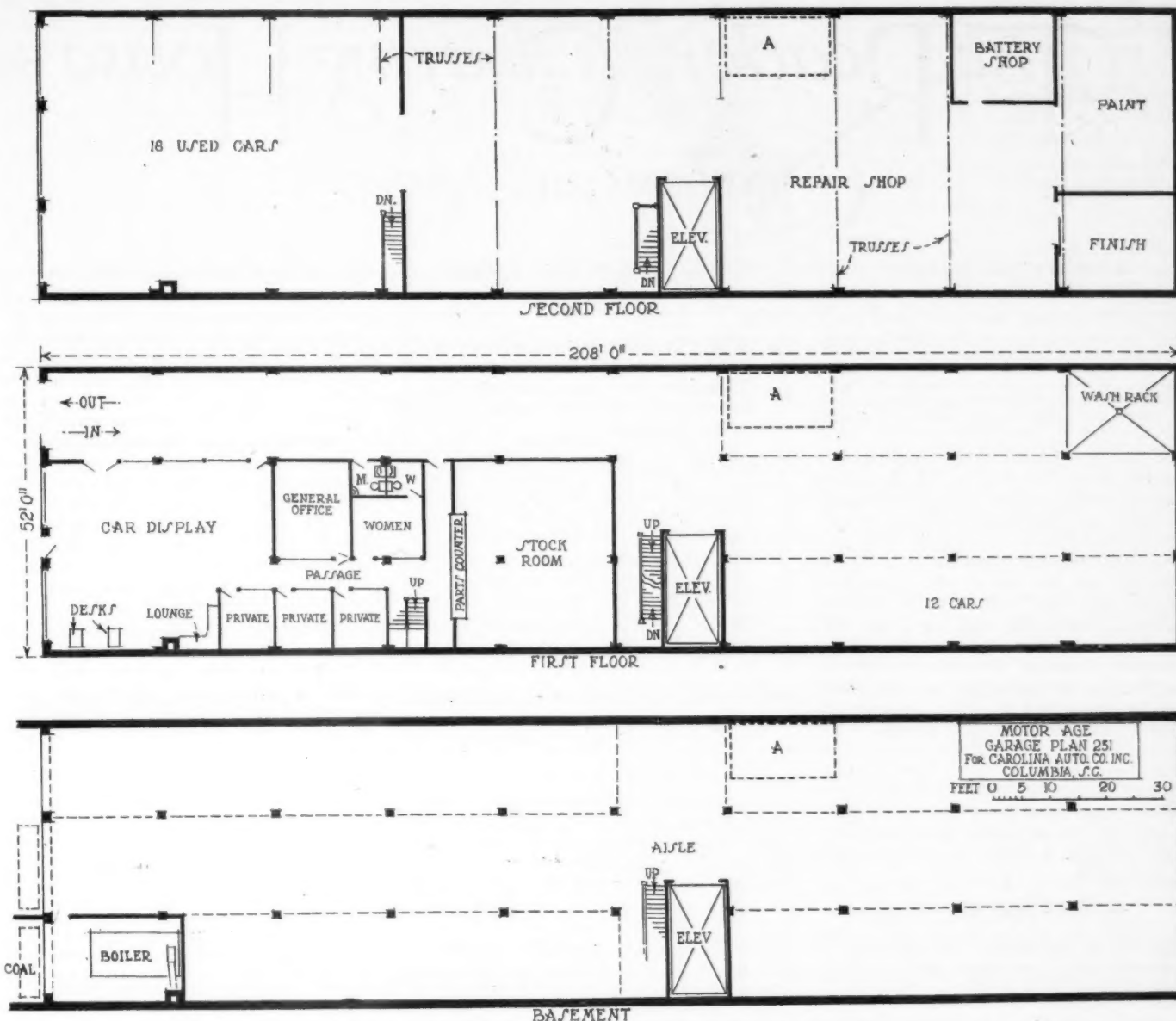
In making the future extension it would be well to extend the shop to the line A and extend the aisle to the other side of the building, storing cars on each side and giving space for some special shops on the corners as indicated.

No. 253

CONCRETE BLOCKS

Would concrete blocks make as good a garage building as brick or plain concrete? The garage in question is to be one story and will be erected on a 60 by 100 ft. lot. The 60-ft. side faces the street and the opposite side is on an alley. There is to be a showroom for the display of two cars, a small store for accessories and a shop employing four men. Also a storage space for about fourteen or sixteen cars.—E. M. Bandli, Enumclaw, Wash.

Whether you make your building 50 or 60 ft. in width it would be best to use the extra 10 ft. as an entrance to the garage and shop. This may be roofed over or not as you see fit. By cutting the building to 50 ft. width all the way you lose storage space for two cars and sacrifice 10 ft. in the length of your shop. If you desire an alley outlet, it might be gained this way instead of making an aisle through the building, thereby saving between \$900 and \$1,400.



No. 251—Narrow service building on inside lot

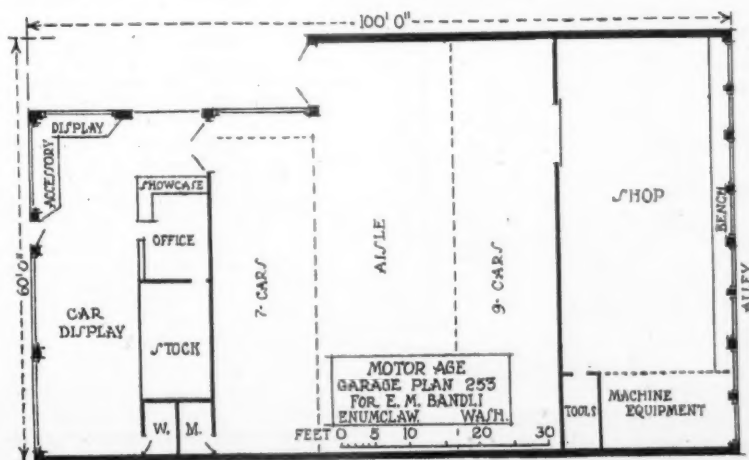
A good way to construct the roof of this building would be to truss the garage part and use mill construction over the sales and shop portions; this latter consists of heavy beams supporting the rafters.

There is no reason why cement blocks if properly made are not as good as

brick or solid concrete for a one-story building. If trusses or any other heavy weights are carried on them so that there is a concentration of weight on a small surface, it would be well to distribute the weight by an insert of solid concrete bearing on two or three blocks. The blocks being hollow and their walls com-

paratively thin are likely to crush if forced to carry too heavy a load.

Cement blocks make a rather unattractive looking front as they have no color and are of an awkward shape and size. We would suggest a facing of a more attractive brick be used for this purpose.



No. 253—Sales and service building

LOUISVILLE DEALERS PLAN TOUR

Louisville, Ky., Aug. 2—In the interest of motorizing farm equipment, the Louisville Truck Dealers association will conduct a tour from August 16 to 22 through Oldham, Shelby, Henry Trimble, Anderson, Mercer and Nelson counties holding demonstrations at the various county seats.

At a recent meeting Richard Bean, vice president of the Louisville National Banking Co., spoke on the credit situation, explaining what the bankers considered "ready cash" and warning the dealers against too heavy allowances on second-hand trucks in making sales. The association was formed in June following the ship-by-truck campaign with Robert M. Kerr of the Merchants & Manufacturers association as secretary.

The Readers' Clearing House

Questions and Answers

LOW TENSION IGNITION

Q—INSTRUCT how to direct the current from the dry cell batteries through coil and timer and thence to spark plugs. This is an old 1-cylinder Brush engine that I desire to rig up for light belt work. Have a master vibrator coil from a Ford which I desire to use in place of a regular coil. Instruct how to hook the wires up correctly.—Harry H. Reeder, Perulack, Pa.

A diagram showing the path of the current from the battery to the spark plug is shown in Fig. 1. We cannot see the logic of attempting to use a master vibrator for your ignition coil. The purpose of the master vibrator is to do the vibrating for the other coils and is for use in connection with multiple cylinder engines. Since you only need one coil we cannot see where there is any call for a master vibrator. The master vibrator has but one primary winding and when used is connected in series, so the primary current must travel through it before it reaches any of the coils. The thing for you to do is to use a single coil and connect it as shown in the illustration that answers question 1. The breaker should be connected to the camshaft, so that it will travel at one-half engine speed.

TWO SPARK IGNITION

Q—Does an engine with two spark plugs to each cylinder develop more horsepower than a cylinder with but one spark plug igniting gas?

The advantages of two sparks occurring in the cylinder at the same time are greater output and greater efficiency of the engine. In some cases, a double ignition system is used, that is where two sets of plugs are used receiving their current supply from independent sources, so in case one system fails, the other will function. This system is very reliable.

FORD F. A. SYSTEM

Q—Publish internal wiring of the F. A. generator used as standard equipment on Ford cars.

2—Explain how to test out generator when it does not charge. Explain each step carefully so that we can tell whether the trouble is in brushes, commutator, armature winding or field windings.

3—Explain the operation of the so-called "reactance coil" connected in circuit with ammeters that show the output of Ford magnetos.—Ray and John Samuels, Kansas City, Mo.

1—Shown in Fig. 2.

2—The generator field takes about 2.5 amperes when connected to a six volt battery if the field is in good condition. If the generator is run as a motor, it takes 9 amperes from a six volt battery if there are no shorts or grounds in armature, and if field is O. K. The first thing to look for is loose, grounded or short circuited wires and connections. Remove the cover from the rear end

CONDUCTED BY ROY. E. BERG

Technical Editor Motor Age

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

The Electric System

housing. Look in through the openings in the housing and inspect the wire leading from the generator terminal to the ungrounded main brush and the wires leading from the field coils to the third brush and the grounded main brush. See that the insulation on these wires is not torn or cut at any point. See that the pigtails connected to the brushes do not touch the end housing or the brush ring. They may, however, be allowed to touch the brush holders. Watch for excessive sparking at the brushes which

may be due to one of the following causes: brushes of poor material, or replaced with the wrong size or type; armature loose or carried eccentrically in its bearings; brushes not bearing on the proper points of the commutator; short circuited, grounded, or open circuited coil in the armature. Excessive sparking may be caused by dirty commutator, high mica, or roughened commutator segments. If the above conditions are not present or the adjustment and test of the above do not remedy the trouble, you should then proceed to test the field coils. Before proceeding to test the generator, the connections should be gone over carefully and a trial can be made by holding the cut out points closed.

3—The reactance coil which is connected in the ammeter circuit, acts as a current limiting device to protect the ammeter. The reactance in the circuit is one of the important factors governing the flow of current according to one of the basic laws of alternating currents. At high speed there is a high voltage generated by the Ford magneto and the amount of current delivered will be relative to the amount of reactance in the circuit.

CHEVROLET WIRING

Q—Publish wiring diagram of the mid-season 1915 Chevrolet Baby Grand having the coil on the motor arm instead of having it on the switch.—Alan W. Dunwiddie, Janesville, Wis.

Diagram of the late 1915 Chevrolet is shown in Fig. 3.

MAXWELL AMMETER INSTALLATION

Q—Would it be possible to install a Weston ammeter which shows charge and discharge, and a three pole relay in place of the regular ammeter and relay on a 1918 Maxwell Simms Huff system?—Thomas C. Watson, Dow Auto and Machine Co., Mt. Vernon, Ark.

We advise connecting the ammeter as shown in the April 3 issue of Motor Age.

CHANDLER WIRING

Q—Publish wiring diagram of the Gray and Davis system on a 1920 Chandler coupe including ammeter installation?—T. L. Burton, New York.

The Ammeter installation on the 1920 Chandler is shown in Fig. 4.

GENERATOR REGULATION

Q—Publish wiring diagram for the Franklin 1917 Series 9 touring car.

2—What can be done to the little four Overland to increase its output above 10 to 12 amperes, and about what is the limit? Have trouble keeping the storage batteries charged on these little cars in this section of the country. What else would you advise me to do in this case, as the trouble seems to be chronic?

3—What provision is made for increasing the generator output of the Bijur generator used on the new 1920 Velies.—Edwin G. Ford, Auto Sale and Service Co., Winona, Miss.

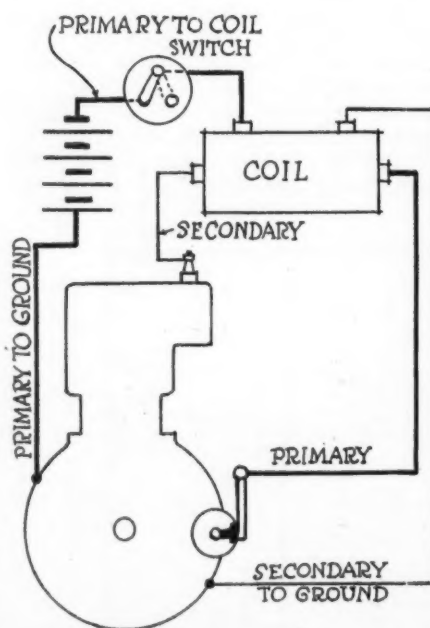


Fig. 1—Showing path of current from battery to spark plugs on Brush engine

1—Wiring diagram of the Atwater Kent system on the 1917 Franklin Series 9 is shown in Fig. 7.

2—The generator should begin to charge at about $7\frac{1}{2}$ miles per hour and reaches maximum charging rate of about 14 amperes at a speed of from 22 to 24 miles per hour. The rate is regulated by the third brush method. To increase the charging rate move the third brush in the direction of rotation and to decrease the rate, move the third brush against the direction of rotation. We do not see why the batteries should run down if the charging rate is set according to factory instructions and we do not think the rate should be increased very much above that as it will, in all probabilities, ruin the battery in time.

3—The system of regulation used on the Bijur generator is the same as that explained in question and the method of setting the third brush applies.

ENGINE TO DRIVE GENERATOR

Q—Could a 15 K.W. 120-volt generator D. C. and one 5 K.W. 170-volt be successfully operated by a Continental unit power 4-cylinder model E engine?

2—Instruct how this should be connected. It is to be used for power in garage also for lighting village and furnish power for small motors such as fans, etc.—G. A. M. Benson, Danvers, Minn.

1—The model E engine develops about 45 horsepower at 1500 r.p.m., and this is almost double the power necessary to handle a 15 k.w. generator.

2—The proper way to connect the generator and engine is direct through a coupling if the speed of the generator is not more than 1500, but if it is you will have to drive it by belt. The circuit for the power distribution will have to be worked out to suit your case, depending upon the distances the power is to be transmitted, the amount to be delivered at each place and other factors entering into the calculation.

COLE WIRING

Q—Publish diagram of the ignition system on a 1920 Cole 8.—A Reader, San Francisco, California.

Delco system on the 1920 Cole model 870 is shown in Fig. 6.

U. S. L. SYSTEM

Q—Publish wiring diagram of the Willys-Knight model K 1915 equipped with the U. S. L. system and 24 volt battery.—F. M. Hallock, Tarrytown, N. Y.

Shown in Fig. 5.

DELCO ON COLE

Q—Publish wiring diagram of the Delco system on a 1914 4-cylinder Cole.—William Stephens, Bureau, Ill.

The Delco system on the 1914 4-cylinder Cole is shown in Fig. 8.

SIMMS-HUFF ELECTRIC SYSTEM

Q—The horn cuts out and sometimes refuses to sound when the engine is running fast, but seems to operate when the car stops. Could this be caused by the generator?

2—Publish an internal diagram of the Simms-Huff starter-generator used on a 1918 Maxwell touring car.

3—How is the generator output regulated? The charging rate seems to be too low?—J. A. Zaller, Mt. Vernon, Ind.

1—The information regarding this trouble is so limited that it is impossible for us to give you anything but possible causes for the trouble. It may be due

TO assist readers in obtaining as a unit all information on a certain subject, MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

THE ELECTRIC SYSTEM

Harry H. Reeder.....Perulack, Pa.
Ray and John Samuels.....
.....Kansas City, Mo.

Alan W. Dunwiddle.....
.....Janesville, Wis.
Thomas C. Watson, Dow Auto and
Machine Co.....Mt. Vernon, Ark.
T. L. Burton.....New York
Edwin G. Ford, Auto Sales and
Service Co.....Winona, Minn.
G. A. M. Benson.....Danvers, Minn.
A Reader.....San Francisco, Cal.
F. M. Hallock.....Tarrytown, N. Y.
William Stephens.....Bureau, Ill.
J. A. Zaller.....Mt. Vernon, Ind.

MISCELLANEOUS

J. A. Zaller.....Mt. Vernon, Ind.
Leo E. Cuttlerman.....Slayton, Minn.
A Reader.....Pleasant City, Iowa
E. A. Walsh.....Niagara Falls, N. Y.
W. R. McMann.....Yonkers, N. Y.

THE POWER PLANT

H. G. Hall.....Washington, D. C.
William Rees.....Scranton, Pa.
Allie J. Howard.....
.....West Bloomfield, Wis.
A Reader.....Pleasant City, Ohio
Esca Fargy, Holmes Garage.....
.....Shamrock, Texas
A Reader.....Augusta, Mich.
C. W. Canady.....San Antonio, Tex.
A Reader.....San Francisco, Calif.
M. A. Graven, Valley Auto Co.....
.....Puvallup, Wash.

CLUTCHES AND GEARS

Adolph Montag.....West Bend, Iowa
Ray V. Redmon.....Ketchum, Idaho
Elmer M. Young.....Weatherly, Pa.
G. A. Feltman.....Chamberlain, Pa.
Theo. P. Thomas.....
.....Lafayette, Ind.
Lloyd G. Olson.....Hendricks, Minn.
W. A. Marlin.....
.....Pleasant Valley, Wheeling, W. Va.

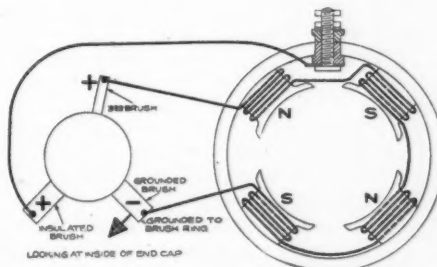


Fig. 2—Internal wiring of the F. A. generator used on Ford

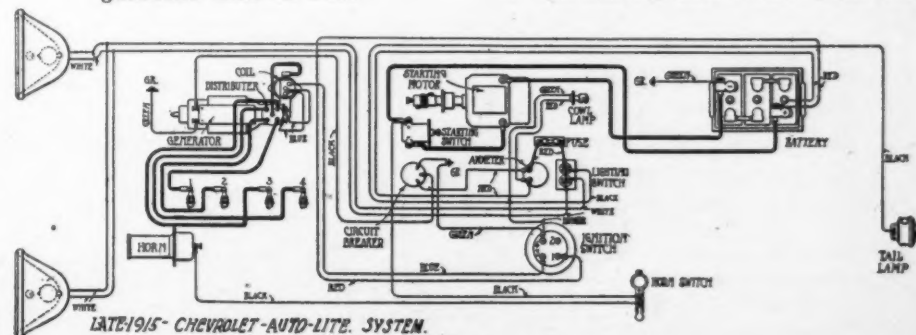


Fig. 3

to a loose connection that is only noticeable when the engine is running at a high enough speed to cause considerable vibration. Check over the switch connection carefully as it may be due to switch trouble. Examine the ground connection in the horn circuit to see that it is making a positive connection.

2—Wiring diagram showing the internal circuits on the 1918 Maxwell is shown in Fig. 11.

Miscellaneous

SPEEDING UP LEXINGTON

Q—Instruct how to speed up a 1919 Lexington 6-cylinder car. It will not make over 45 m.p.h. The engine works fine except that it heats. Have tried timing the engine differently. It is now timed: Intake opens 7 degrees after upper dead center and closes 42 degrees after lower dead center. Exhaust opens 55 deg. before bottom dead center and closes 8 deg. after top dead center. It makes 50 m.p.h. with this timing. The engine is clean and the valves seat correctly.

2—If different ring gears were installed, need much power be sacrificed? Have also installed a Stromberg carburetor and obtain 15 to 17 miles per gallon.—Leo E. Gutterman, Slayton, Minn.

Examine spark and see if it is not occurring too late. This would cut down the speed considerably and also cause excessive heating. It is also possible that in an endeavor to get maximum economy from the carburetor, the setting is so lean that you are sacrificing power and therefore speed.

2—We do not advise the installation of a different set of gears as the present design should give plenty of speed. The reduction of gear ratio will certainly decrease pulling power and would not be in compliance with the design which the Lexington engineers have worked out.

CARBURETOR TROUBLE

Q—A 1918 Maxwell touring car refuses to hit on four cylinders. The valves have been ground, new spark plugs and new Van Briggie carburetor have been installed. The breaker points and contacts have been cleaned and adjusted. The engine idles nicely with one turn of the needle valve, but when on a pull it requires two and one-half turns, and this only gives a mileage of 10 m. p. g. Sometimes the engine stops very suddenly as though the switch were turned off, but starts easily. Is it possible that the fault is in the coil, as the missing is mostly on a pull in high gear?

2—The starting pinion which slides into

mesh with the flywheel refuses to come out after the engine is started. Should this pinion be pinned to the shaft so the outside spring would pull it out of mesh, when the starter pedal is released?—J. A. Zaller, Mt. Vernon, Ind.

1—This is apparently carbureter trouble. If after the carbureter has been carefully adjusted, you still have trouble, check over the ignition system. Remove the spark plugs and see if they have the proper gap. Test the battery, as a weak battery will cause missing. It seems as though 10 miles per gallon is a rather low figure, but the only thing we can suggest is a careful carbureter setting.

2—This trouble is often caused by improper alignment of the starting motor. First remove the outer end bolt holding the spring and sleeve in position and remove the spring sleeve and gear. Wind a strip of emery cloth on a round stick and thoroughly clean the inside of the sleeve. Clean the armature spindle carefully with fine emery cloth. Apply a small amount of light graphite grease to the inside of the sleeve and replace the parts. To bring the starting motor into alignment, loosen the four bolts holding the starting motor to the transmission, and place a 1/64 to 1/32 in. shim between the engine support and the gear bracket. This shim should be placed on the inside of the engine nearest the gearbox (this may or may not be necessary).

SPARK ADVANCES

Q—A 1914 4-cylinder Henderson car equipped with thermo-siphon water system, Bosch magneto, and Rayfield carbureter, overheats after being driven a few miles. The cooling system has been flushed but no stoppage was found. The carbureter has been adjusted for a lean mixture as it will spit when running, this is remedied by pulling up choke. The engine will not run smoothly on the battery but when it is switched on the magneto it will run correctly. When the spark has been advanced as far as it will go on the wheel, the engine will pick up and speed up a little. It has no power on hills and after running a few miles the water, which has boiled away, must be replaced.—E. A. Walsh, Niagara Falls, N. Y.

All of the factors mentioned point to the spark setting as the source of trouble. The fact that the engine will not pick up until the spark lever is advanced about as far as it will go indicates that the spark is retarded too far under average conditions. Retime the ignition and advance the spark setting.

PUTTING OIL IN GASOLINE

Q—Would putting 1 pt. of light oil with every 5 gal. of gasoline reduce carbon and also keep the valve stems free. At times the valves on a 1920 Pierce-Arrow are sticky. This is freed with kerosene. 2—Where can a Sonoscope be secured?—W. R. McMann, Yonkers, N. Y.

1—Putting 1 pt. of lubricating oil in 5 gallons of gasoline certainly will not reduce the carbon any. The only time that lubricating oil is ever mixed with gasoline is when the engine is very new and this is done to prevent the engine

from freezing up if it is driven very hard. Cars that are given a good road test before leaving the factory will run alright without the addition of anything in the gasoline. With gasoline as it is to-day, the introduction of lubricating oil will not improve it as a fuel and we do not advise taking the matter up with your distributor as there is no reason why this condition should exist.

2—The American Electric Co., 6401 S. State St., Chicago, Ill., make the Sonoscope.

The Power Plant

KNOCK DURING ACCELERATION

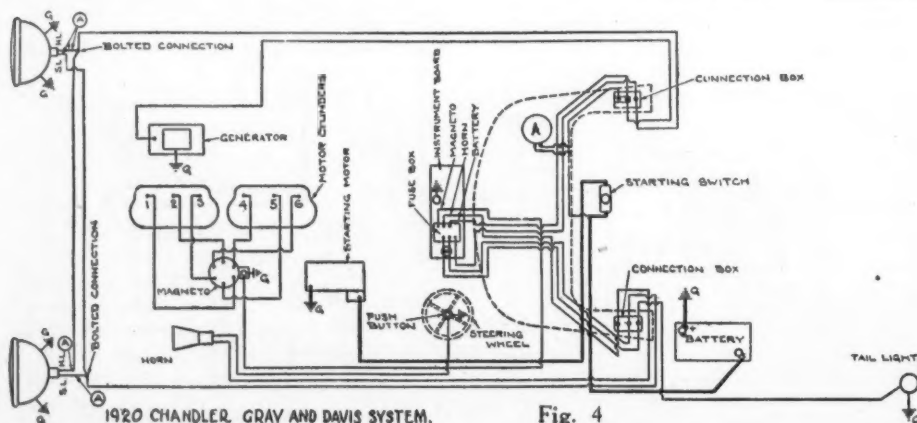
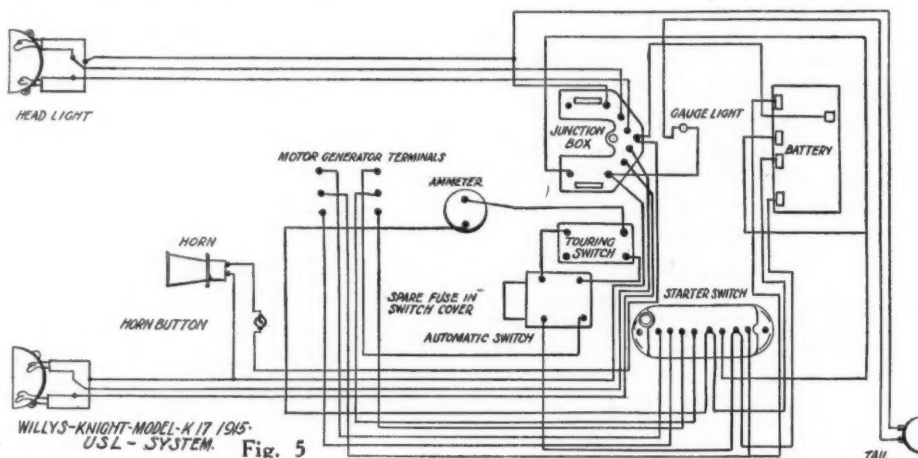
Q—The pistons in a new 1920 Dodge roadster come fully 1/8 in. above the cylinder block at top of stroke and engine knocks when the throttle is opened quickly. There is a slight carbon deposit formed 500 miles after cleaning carbon and grinding valves. Could 1/8 in. be safely machined off of the top of piston?—Hal G. Hall, Washington, D. C.

In the first place are you sure that the knock is caused by the piston or because of too high compression. Measure the compression with a gage and if you find that it is not above about 65 or 70 lbs., you can be quite sure that the trouble is not caused by too high compression. An improper carbureter setting oftentimes causes a very pronounced knock when the throttle is opened suddenly. This is due to the fact that the mixture is correct for running at high speeds but when the throttle is opened suddenly, the sudden inrush of air makes the mixture too weak and the result is poor acceleration

and very often a decided knock. It is advisable to examine the spark setting as well, for if too far advanced, a knock will also result. In any event, we do not advise machining off any of the piston heads, as this will weaken the piston and the chances are that the result will be a blown-out piston head. This slight carbon deposit is not unusual and may be attributed to the following causes: Lubrication, carburetion and common road dirt. Tests conducted during the war by the U. S. government showed that from 65 to 85 per cent of the carbon deposit found in their truck engines was due to dirt.

THE DUESENBERG ENGINE

Q—Show a shadow outline of the famous Duesenberg racing engine with side operating valves. State the number of cylinders, bore and stroke and approximate horsepower. Your recent article stated that they make an 8-cylinder engine while the "Scientific American" had an article in a recent issue regarding the



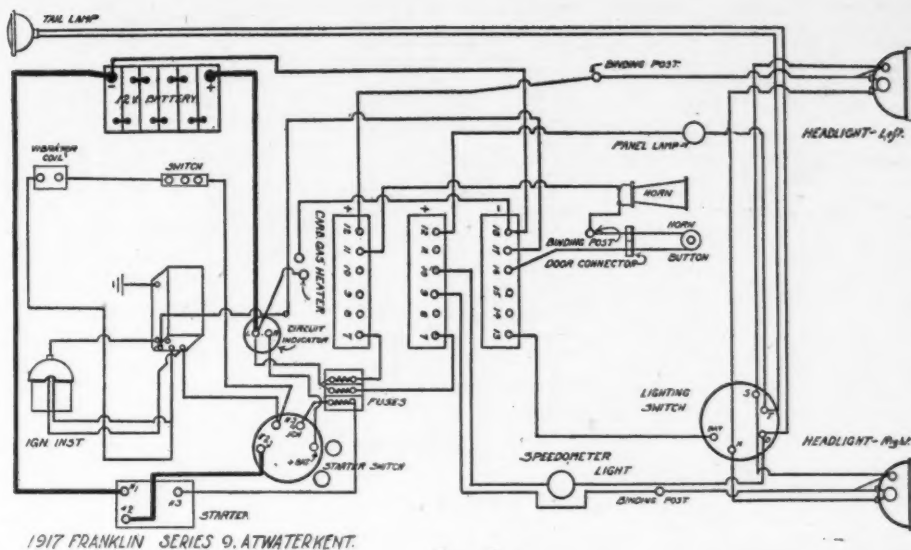
Duesenberg special 16-cylinder engine which leads the reader to believe that it is an 8-cylinder car—two fours set in opposed position.—William Rees, Scranton, Pa.

A view of the new 8-cylinder racing engine built by Fred Duesenberg was published in the June 3 issue of Motor AGE. Full details of the engine to which the Scientific American referred was undoubtedly the combination of two 8-cylinder engines which were used in the car that set the world's record for speed. This outfit was composed of two 8-cylinder Duesenberg racing engines connected positively to the rear axle through two propeller shafts, the torque tube being located in the center.

ENGINE KNOCKS

Q—A very loud knock in the engine of a 1915 Interstate occurs at 20 m.p.h. or over. The knock becomes louder as the gasoline is increased. When the throttle is closed, the knock disappears. When the engine is running light at high speed, the knock is also very loud.—Allie J. Howard, West Bloomfield, Wis.

This knock can very likely be attributed to one of the following causes: worn piston rings and piston or carbon deposit. If it is a result of worn pistons or piston rings, the knock will be slight and gradually increase as the car is being placed under a pull. The piston rings may be standing still momentarily while the piston travels its first 1/64 of an inch, or the piston may be driven against the cylinder walls at the beginning of the power stroke. In the case of carbon deposit, the knock will have a distinct metallic sound and will increase greatly as the throttle is opened. If the knock is heavy or of a light muffled



1917 FRANKLIN SERIES 9. ATWATERKENT.

Fig. 7

Therefore, if the firing order of the twelve starts with R 1 on its power stroke, R 4 will fire 120 deg. later. L 1 will fire 60 deg. after R 1 has fired and L 4 will fire 120 deg. after L 1 has fired. This means, of course, that there will be an overlapping of the power strokes, but as far as we can see there will be no irregularity.

PISTON SLAP

Q—An Overland 90 which has been run 3500 miles has a sharp distinct knock at all speeds. Believe it is in fourth cylinder as when the cylinder is not firing the knock cannot be heard. The piston has been removed; the pin seemed a little loose. A new bushing was installed and connecting rods and main bearing seems tight but the knock is persistent.—A Reader, Augusta, Mich.

The fact that the noise is not present when the cylinder is not firing seems to indicate that the knock is piston slap. This may be a result of a poor fitting piston or a bent connecting rod. It would be advisable to make a careful examination of the valve mechanism. Knocks are often caused by poor tappet adjustment, a worn valve stem guide, play in the push rod guide, worn cylinder or cylinder nuts. The thing to do is to remove the piston and connecting rod of that cylinder, measure up the cylinder and piston carefully and line the piston and rod up correctly.

COLE VALVE TIMING

Q—Publish valve timing of a 1920 Cole 8.—A Reader, San Francisco, Calif.

Valve timing diagram is shown in Fig. 9.

PISTON WEIGHT

Q—Will the weight of the piston make any difference in the power of an engine if compression, piston expansion and other conditions are the same, and if so, how much greater power may be derived from lighter pistons?—M. A. Graves, Valley Auto Co., Puyallup, Wash.

The weight of a piston is of importance because it is one of the factors that has an influence on the engine speed. The lighter the reciprocating parts, the less vibration and the greater the engine

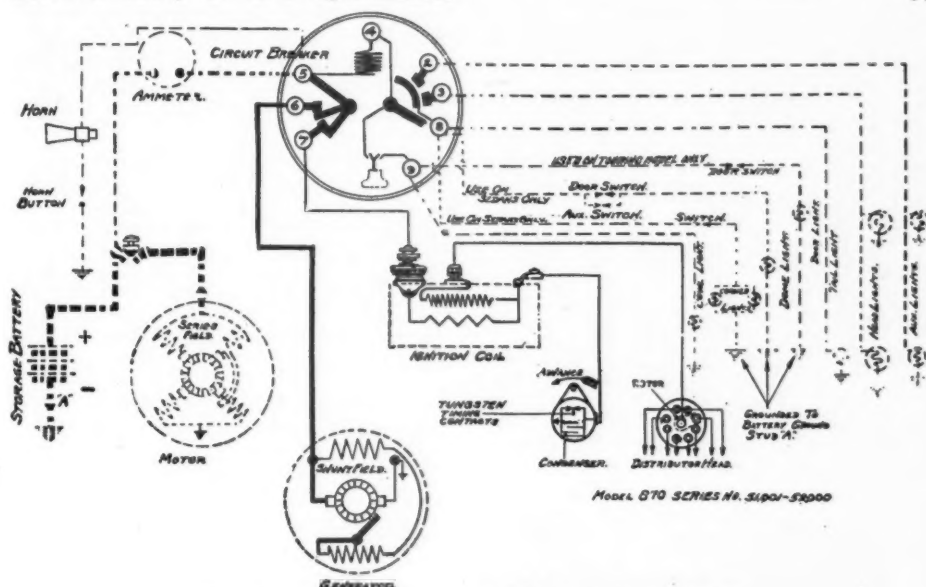


Fig. 6—Delco system on a 1920 Cole 8 model 870

sound, it may be caused by loose connecting rods, worn piston pins or bushings. If the engine has a pound like a block of wood striking the ground, it is probably due to a loose main bearing. It would be advisable to inspect the timing gears as well as worn bearings or broken teeth will also cause a very loud knock.

METALLIC ENGINE KNOCK

Q—There is a metallic knock in a Buick 6 K 45 1920. It sounds like loose connecting rods but I cannot find any play in the connecting rods, crankshaft or flywheel. When the engine is pulling hard it can be heard, especially on hills.

2—Will the oil cushion tappets for overhead valve engines stop all noise and run as smooth as L-head or T-head engines?—A Reader, Pleasant City, Ohio.

1—Your description of the noise is so general that it is impossible to locate the trouble and give you a definite remedy for it. The fact that it is very prominent when the car is under a heavy pull points to the possibility of a spark knock due to too much advance. Perhaps, it is a valve that is not seating properly. Examine the pump shaft and see if there is not some play. If the car has been run very far, it would be advisable to remove all of the valves, clean out the

carbon and grind the valves in again. The knock may be a result of too lean a mixture and therefore it would be advisable to reset the carburetor.

2—We assume that you refer to the oil cushion tappets that have been advertised. Since we have no official reports concerning these oil cushions, we are not in a position to state what they are able to accomplish. It may be said, however, that the L-head engines have given the quietest operation of the two. In determining what the oil cushions will do, you will have to pass judgment on the claims of the manufacturers.

CYLINDER ENGINES

Q—Explain how a Weidley 12, engine fires with the same number of degrees of crankshaft movement when the firing order is R1 L1 R4 L4 R2 L2 R6 L6 R3 L3 R5 L5. It seems there would be an irregularity. In other words, would there be 60 deg. between each explosion (crankshaft movement)?—Esca, Fargy, Holmes Garage, Shamrock, Tex.

We do not understand what you mean by the term irregularity. The twelve cylinder engine is composed of two blocks of six cylinders each. Each block has a definite firing order which will be every 120 deg. of crankshaft travel.

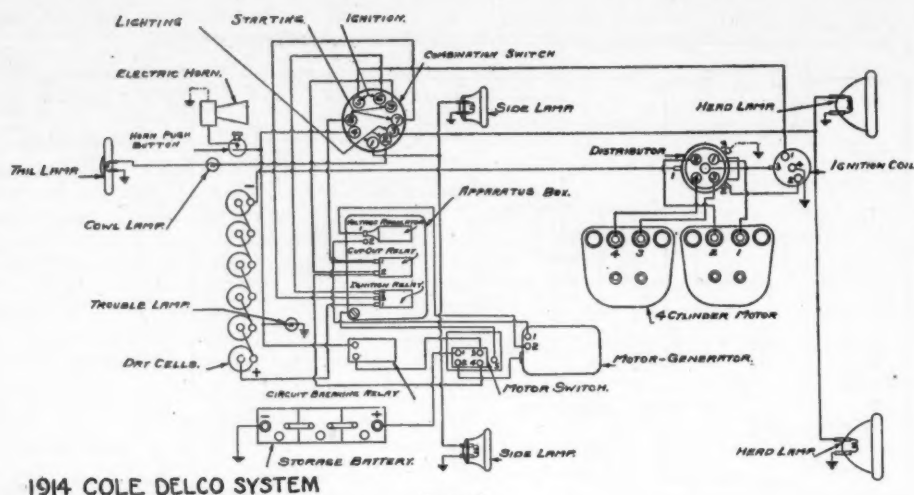


Fig. 8

speed. Oftentimes the installation of light pistons and connecting rods will increase the engine speed several hundred revolutions, and, of course, this means greater power and speed. This is permissible partially because of reduced vibration and the power produced will be in almost direct proportion to the increase in engine speed.

Clutches and Gears

CLUTCH ADJUSTMENT

Q—Instruct how to adjust the clutch on a 1916 Hupmobile model N.—Adolph Montag, West Bend, Iowa.

The clutch is illustrated in Fig. 10. By examination, it will be found that the clutch-cam lever is provided with holes at different distances from the cam, which arrangement changes the pressure necessary to disengage the clutch and also clutch brake will become operative. When the clutch trunion connection is made at the lower hole, less pressure is required to disengage the clutch, but the clutch brake will operate a little more slowly.

STODDARD-DAYTON TRANSMISSION

Q—Instruct how to prevent a Stoddard-Dayton 1910 from leaking oil at the rear crankshaft bearing. It throws out a gallon of oil about every forty miles.

2—Give the adjustment of the ring and pinion gear.

3—Desire to change into a truck and install a lower gear such as 5 to 1 or 6 to 1. Where could I have such a gear made?—Ray V. Redmon, Ketchum, Idaho.

1—The reason the oil is leaking out at the rear main bearing is because the bearing is not fitting properly. If it cannot be taken up, you will have to refit a new bearing.

2—On either side of the differential is a set of roller bearings, the outer cone of each being contained in a yoke bolted to the differential housing, and which position is constant. If, by examination, there should be any horizontal play in the differential gear complete, it is possible to overcome this by crowding the differential in or out of mesh with the pinion gear by adjusting collar, whose

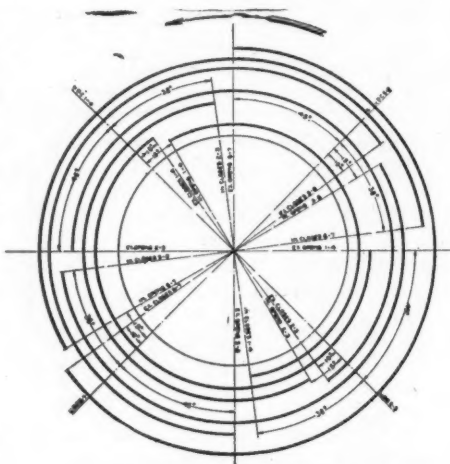


Fig. 9—Timing diagram of the 1920 Cole 8

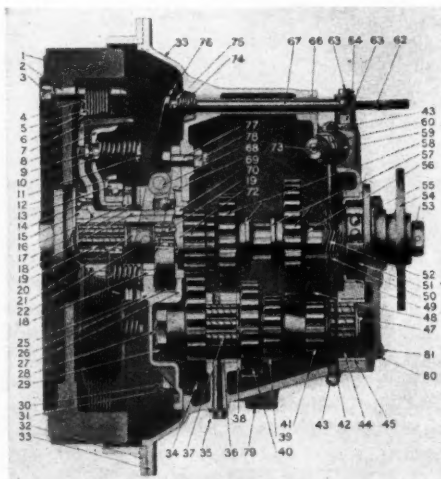


Fig. 10—View of the 1916 Hupmobile model N clutch

inner surface is threaded and travels on the hub of the differential. This enables the bearings to be adjusted in to or out of the cup contained in the differential housing. After adjustment is made, be certain that one lip of the lock ring engages the small locking nut. If after adjusting the large bevel gear into the pinion horizontally, you discover that the pinion gear is too deeply in mesh with the large bevel gear, this can be relieved by operating the adjustment on

the torsion tube where it enters the rear axle housing. If the pinion gear is to be engaged more deeply in mesh with the large bevel gear, turn the adjustment to the right. If the pinion gear is to be withdrawn from the large gear, turn the adjustment to the left, and when the pinion gear lines up according to the mesh of the teeth, be sure that the torsion tube is locked into the differential housing by means of the washer and bolt provided for the purpose. The roller bearing adjustment on the pinion shaft is accomplished by means of the threaded socket at the forward end of the tube. If the pinion shaft is too tight, the bearings can be relieved by turning the socket to the left. If too loose, turn the socket to the right. After the adjustment is made, be sure that the locking washer is in place in one of the slots of the socket.

3—The following companies will furnish gears to order: Brown-Lipe-Chapin Co., Syracuse, N. Y.; Warner Gear Co., Muncie, Ind.; Wm. Ganschow Co., 1001-05 Washington Blvd., Chicago.

STARTING FORD IN REVERSE

Q—Can you start a Ford engine by letting it drift down a hill backward in reverse gear?—Elmer M. Young, Weatherly, Pa.

Yes. In reverse gear you will have the greatest gear ratio and, consequently, the engine will turn over the greatest number of revolutions per revolution of the rear wheels.

NASH SPORT MODEL

Q—What is the present price of the Nash Six sport model equipped with wire wheels and the price before the last raise.

2—What is the gear ratio of this car?

3—What speed should this car make?

4—How many miles per gallon will this car give?—G. A. Feltman, Chamberlain, S. D.

1—We do not keep information of this kind in our files and, therefore, we advise taking the matter up with the Nash factory at Kenosha, Wis.

2—The gear ratio is 4.50 to 1.

3—This car ought to make from 60 to 70 miles per hour under average conditions. It is impossible to state a possible maximum speed as it is dependent upon many factors, the most prominent being the personal factor, or the driver.

4—This is entirely dependent upon the carburetor setting but under average running conditions it ought to make from 15 to 18 miles per gallon.

HUDSON RACING CARS

Q—What is the gear ratio and maximum r.p.m. of the engine in the Paige 6-55 speedster?

2—What would be the probable speed of the Paige 6-55 car on a concrete pavement, with all conditions favorable?

3—In what ways were the Hudson racing cars different from the regular Hudson stock model? What was their maximum speed?

4—What is the highest speed ever obtained with each of the following cars, Hudson Super Six, Marmon 34, Stutz four passenger and Essex? For what distance were these speeds maintained?

5—What is Louis Chevrolet's address? What cars besides the Frontenac has he designed?—Theo. P. Thomas, West La Fayette, Ind.

1—The gear ratio of the Paige 6-55 speedster is 4.36 to 1 and the engine attains 55 miles per hour at 2100 r.p.m.

2—Under favorable conditions the speed of the Paige 6-55 would be about 55 to 60 miles per hour.

3—The Hudson racing car, driven by Ira Vail, and in which he was so successful, was originally a standard Hudson touring car, purchased from the Brooklyn, N. Y., agency, after having been used by it as a demonstrator for about three months. The Hudson Motor Car Co. has never built any special racing cars which were different from the standard product in any respects, save the weight of the reciprocating parts and size of valves. A description of the car submitted to us by the Hudson Motor Car Co. is as follows: "The frame is standard in every respect except that 20 in. has been cut out of the middle just back of the transmission and the frame welded together again with reinforcements on the inside. The front and rear springs have been flattened out and leaves removed to suit the reduction in weight. The axles are standard with Timken bearings throughout and the gears used are stock gear supplied by the factory, the ratio being 2.61 to 1. This is the highest gear ratio that we supply.

"All parts of the engine, with the exception of pistons, are stock parts. The pistons, while of standard design, that is, having the same diameter wrist pin and with its bearing in the piston, are of Leavitt Magnalite metal. The camshaft and timing, the valve push rods, and valve springs are stock. The valve springs have been increased in pressure by introducing washers between the cylinder casting and the top of the spring.

"The Standard carburetor is used in connection with the standard cylinder block. The expert type of cylinder head, in which the only difference is the metric spark plug holes, is used for the obvious reason that there is less chance for plug trouble with this head, owing to the better cooling of the plug shell and a reduction in the size of the porcelain.

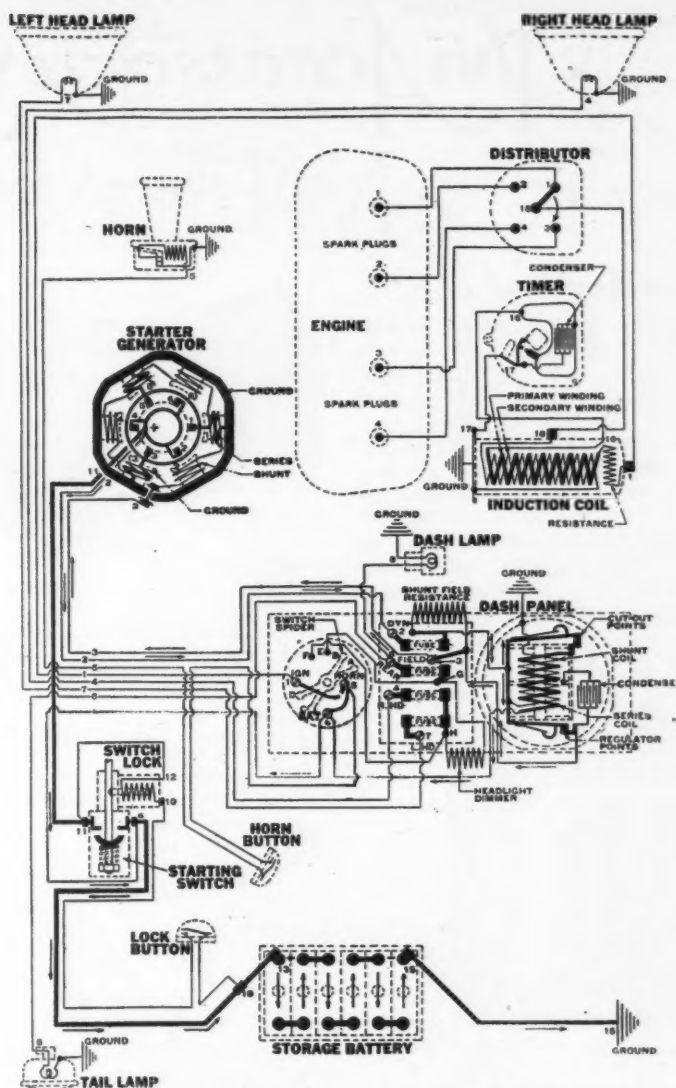
"The clutch, gear shaft, propeller shaft and steering gear are all standard Hudson equipment and without any change whatever.

"The engine is fitted with the standard Delco system throughout.

"The radiator is smaller than standard, and, of course, there is no fan behind it. The bonnet and body are special, being made out of sheet aluminum and are very light weight. The exhaust pipe is of a special type and comes outside the bonnet and body to facilitate cooling, as is common practice in racing cars?"

4—According to our knowledge the Hudson Super Six has attained about 87 m.p.h., the Marmon 34, 85 m.p.h.; Stutz four-passenger, 70 m.p.h., and the Essex 67 m.p.h.

5—The only address we have for Louis Chevrolet is as follows: Louis Chevrolet, consulting engineer, c/o Wm. Small Co., Indianapolis. He has designed three Monroes, three Frontenacs and the car which bears his name.



1918 MAXWELL SIMMS-HUFF SYSTEM

Fig. 11

GEAR TROUBLES

Q—What causes a 1917 Maxwell to have a humming noise at the rear axle? The gears have been stripped several times and one set of gears will not last more than about 1,000 miles. The car has had careful handling.

2—What causes a 1913 Hupmobile to have a very loud humming noise while driven on low and intermediate gears? When it is shifted to high it will run perfectly smooth.

3—Publish a classy and speedy body for a Dodge car.—Lloyd G. Olson, Hendricks, Minn.

1—The hum in the rear axle is caused by poor adjustment of the pinion and ring gear, broken teeth or worn bearings. Since the gears will not last more than a thousand miles, we are inclined to believe that the drive shaft is being thrown out of line, due, perhaps, to worn bearings in the universal joint and the consequence is that the pinion is thrown out of line and the gears strip. The thing to do is to remove the entire assembly, examine the bearings carefully and when assembling, be sure that all of the parts are in perfect alignment. One question of importance is the way in which the gears are secured. It has been found that if the gears are bolted there is a certain amount of vibration of the gear itself that cannot be eliminated.

The way to secure them is with hot rivets.

2—From your description it is evident that the trouble is in the counter shaft. This is probably due to worn bearings which are throwing the shaft and gears out of line. You will have to take the transmission down and replace the bearings if they are found badly worn.

3—A body design for a Dodge car appeared in the July 8 issue of Motor Age.

REMOVING STEERING GEAR

Q—Instruct how to remove the steering gear from a first series Packard Twin Six. What parts must first be removed?—W. J. Marlin, Pleasant Valley, Wheeling, W. Va.

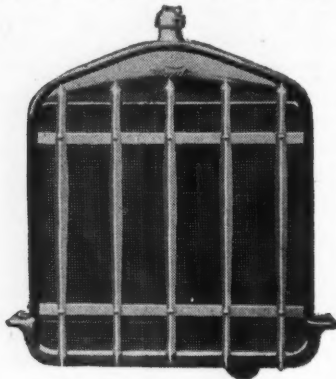
To remove the steering gear, first remove the steering wheel from the steel post; then remove the steering lever or drop arm from the steering lever shaft. It is absolutely necessary to remove the toe board bracket. Then remove the steering gear case grease cup. Take out the bolts which hold the steering case in place. In taking out the gear, the post should be moved toward the right on the front seat, and the case turned so that the steering yoke shaft points downward. Pull the gear out, downward and toward the front. In doing this it is sometimes necessary to bend the hood ledge slightly.

The Accessory Show Case

New Fitments for the Car

Keeno Keyless Lock

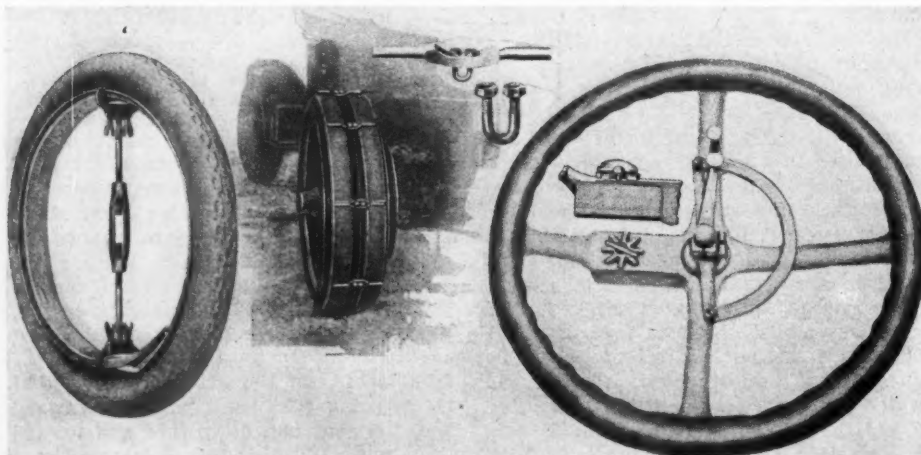
The Keeno lock, as illustrated, consists of a steering wheel, appropriate for any car, on one of the spokes of which is a radial dial consisting of eight raised and numbered ribs. To lock the wheel, you press a release button on the side of the spoke, turn the indicator bar and the wheel is free to spin. To unlock, it is necessary to turn the indicator bar to the proper combination and the wheel is again connected for steering. The Keeno Keyless Lock Co. at 2037 S. Wabash Ave., Chicago, sells this lock for \$27.50 and special equipment for Fords at \$16.50.



Peacock radiator guard

Jackson Improved Tire Tool

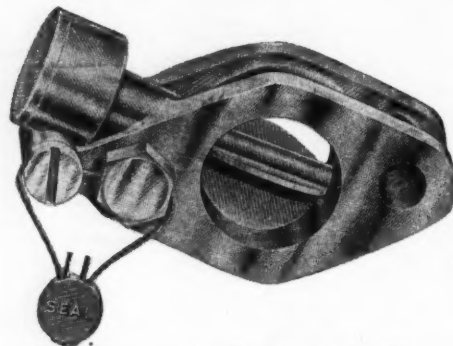
The Jackson Tire Tool, shown in the illustration, is designed for collapsing split rims so as to easily remove an old casing and expand the rim after a new casing has been put on. Any part of the tool that breaks in service will be replaced free of charge if the broken part is sent in. It is a product of the Standard Machine Mfg., 417 Pierce Bldg., St. Louis, Mo., and is listed at \$5.50.



Jackson tire tool

Holmes non-skid grip

Keeno keyless lock



Dell governor for Ford trucks. The adjustment when made can be sealed to prevent unauthorized change

Holmes Non-Skid Grip

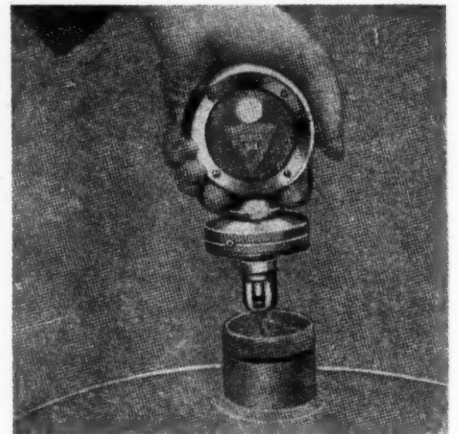
The Holmes Grip is a non-skidding device built for trucks using solid tires. It is of simple construction and strongly built. The illustration shows the installation on a truck wheel. This grip can be placed on the wheel without jacking it up. It is manufactured by the Holmes Mfg. Co., Shelton, Conn.

Whistler

A large percentage of all tire troubles are directly due to improper inflation. The Whistler is an accessory which has been designed to provide a means of determining when the tire is properly inflated, without the usual gage nuisance. Screw Whistler on your tire valve down to the shoulder and set the pressure indicator at the pressure you desire. When inflating a tire the regulator will whistle at the pressure set on the adjusting collar. The Whistler is manufactured by the Automatic Safety Tire Valve Corp., 1765 Broadway, New York, and is listed at \$4 per set of four.

Peacock Radiator Guard

The radiator guard, illustrated herewith, shows the installation for protection for a Ford radiator. The automobile radiator is a delicate and easily broken unit and a protective device which is efficient, easily installed and one that does not destroy the appearance is well worth installing. The Peacock Radiator Guard Co., 275 East Jefferson Ave., Detroit, manufacture radiator guards for any make of car. Prices range from \$5.50 to \$7.75.



Schlaich universal lock to prevent theft of motor meters

Schlaich Universal Motor Meter Lock

Many motor meters mounted on radiator caps are stolen by petty thieves. The Schlaich Universal Lock, designed to retard thefts, is of simple construction and can be installed in a few minutes time. As shown in the illustration, it is provided with a galvanized steel cable which, it is claimed, cannot be cut by pliers. This lock is made in four sizes and is sold by The J. C. McAdams Sales Co., 51 E. 42d St., New York, for \$1.50.

Dell Governor

The Dell Governor, shown herewith, is designed for Ford trucks. As shown, the adjustment when made is sealed against unauthorized change. It is claimed to automatically secure proper fuel feed under all load and road conditions and prevents wear and tear from abuses which follows racing of engine or reckless speeding of the truck. It has but one moving part, a butterfly opening and closing by suction. Construction is simple and the installation easy. The governor is listed at \$15.00 by Dell & Co., Detroit.

Service Equipment

Time Savers for the Shop

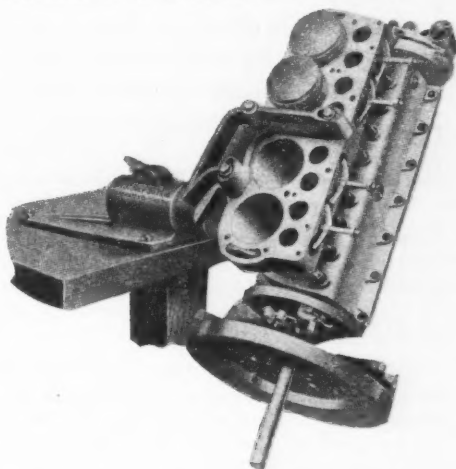
Verson Bench Power Press

The power press, shown herewith, is an adjustable press for light manufacturing purposes and is adaptable for blanking, forming, bending, trimming, punching, etc. It is small, of sturdy and simple construction, yet embodies all of the features of a large press. It is provided with an automatic safety clutch which disengages at each revolution of the press, whether or not the foot treadle is released. The crank is supported by journals on each side, preventing shaft from springing; the opening in back admits light creating a good condition for proper adjustment of dies. The metal can be fed either from front or back, or from left to right, across front of machine. Complete details may be obtained from the La Salle Machine Works, 3013 S. La Salle St., Chicago.

Chuck and Roto-Piston Pump

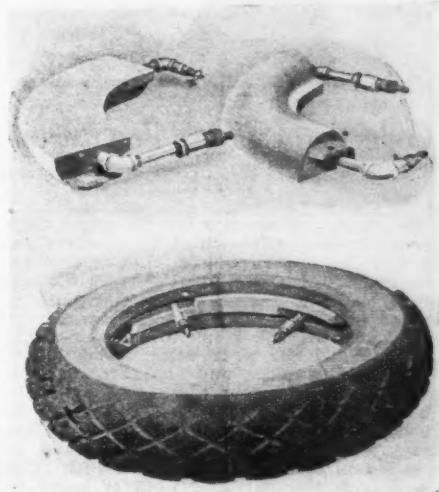
An unusually convenient chuck for shop use has been worked out by the Crescent Pump Co. in connection with their vacuum pump. The pump used to create the vacuum is of an original type known as the "Roto-Piston" and is the invention of William A. Hatcher. It has no valves and the main body or case contains a rotor and both revolve around a stationary main shaft, opening and closing the ports in revolution. It is guaranteed to pull to $\frac{1}{2}$ in. of the barometer which gives a holding pressure of over 14 lbs. per square inch to the chuck. The chuck holds entirely by vacuum and will handle non-magnetic as well as magnetic material and is also convenient for light delicate work. It is a hollow

cast-iron body, finished square and provided with legs for bolting to the machine table. A pipe from one end is connected by a flexible hose to the vacuum tank. A series of small holes is drilled through the top plate in any order suitable for the work to be done. A gasket of rubber of any soft paper is used to prevent leakage between chuck and work. With the top routed out the gasket is unnecessary. For accurate final grinding it may be eliminated. Paper is laid over holes not used for work. A plate already sprung can be drawn down to a level. By holding three points by vacuum a perfect face may be obtained after grinding.



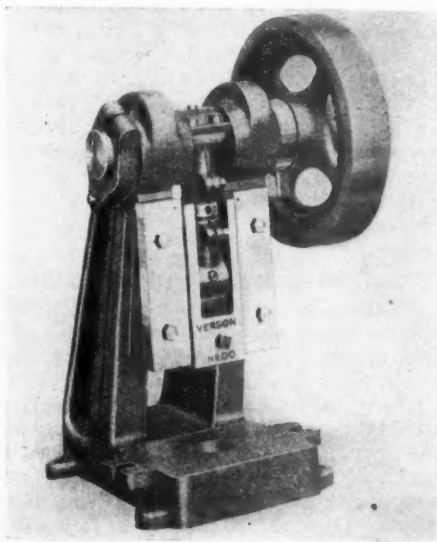
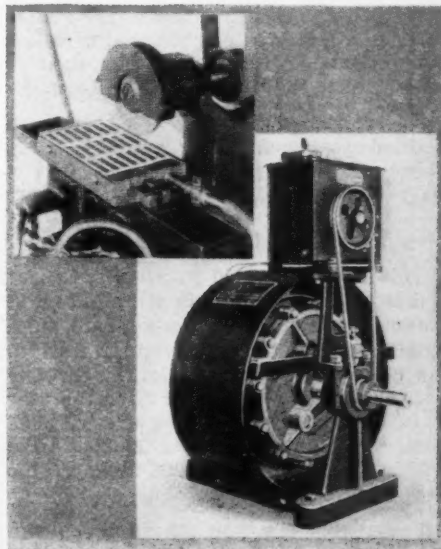
O'Brien Engine Block Support

The engine block support, shown herewith, is a support that can be bolted to a bench and when the engine block is mounted on the support all work such as replacing parts, grinding and adjusting valves and fitting bearings can be done without removing or rehandling the block. The support arm is bolted to the engine with engine head bolts when removed from car and the spindle end of arm slipped into its split bearing box bolted to a bench. The arm with engine attached revolves on the spindle and can be turned to any position convenient for the work being done and is rigidly held there by tightening one screw. The part of the arm that bolts to the engine is offset from the center of its spindle half the depth of the engine. This brings the center line of the engine in line with the spindle, so that whether the engine is top or bottom side up, the height is the same which makes it convenient for the workman. The dimensions over all are 31 in. and the support is tested to 1500 lbs. strain. It is made by the O'Brien Mfg. Co., Denver, Colo.



Cord Truck Tire Vulcanizers

The cord patch vulcanizer for truck tires, shown herewith, is designed in halves instead of all in one round section, to facilitate the insertion of the vulcanizer in the casing. One-half is put into the tire, then the other half is inserted and slid along until both halves fit together over the patch to be vulcanized. The tread is then filled with wet soapstone, tire wrapped, and outside vulcanizer placed over the patch and steam turned on just the same as any other vulcanizer. In this vulcanizer each half is a separate unit, so that the steam can be turned on in either side. It is made for 6, 7, 8, 9 and 10 in. truck tires and is a product of the Pechstein Iron Works, Keokuk, Ia.



Verson bench power press

Chuck and roto-piston pump

Law in Your Business

By Wellington Gustin



Collecting Charges For Repair Work

Q—A short time ago we did some work for a car owner for which he now refuses to pay on the grounds that we overcharged him for the labor. The work was performed by a first class mechanic at the rate of \$1.25 per hour. He was well satisfied with the work and promised to pay the bill the next day. He failed to do this, however, and a statement for the amount was sent him. Now after he has regained possession of the car he absolutely refuses to pay. We would appreciate advice as to what method to proceed in order to collect the bill. Can we attach the car and hold it until he pays, or must we start a law suit against him?—Magnus M. Tast, Grothe Garage, Walthill, Neb.

The Statute law of Nebraska gives the repair man a lien upon automobiles and vehicles repaired, with the right to retain said property until charges are paid. This is simply the common law on the subject.

However, in addition, Section 3842, Revised Statutes of Nebraska, gives him a lien "In cases where he has parted with the possession thereof, for his reasonable or agreed charges, for work done or material furnished; PROVIDED, the person making such repairs or furnishing such material or performing such work shall file in the office of the clerk of the county in which said work was done, or material furnished, or in which said property is kept, within sixty days, after performing such work or furnishing said material, a verified statement and description of the work done or material furnished and a description of the article so repaired, altered or enhanced in value, or for which material was furnished or upon which said work was performed."

Therefore, you should file at once a verified statement as required by the above section, if you are still within the sixty day limit.

Lien Treated as Chattel Mortgage

This lien is treated in all respects as a chattel mortgage and is prior and paramount to all other liens upon said automobile, except those previously filed in the office of the county clerk. The lien will be in force from and after the date it is filed, and may be foreclosed as a chattel mortgage providing this is started within one year after the filing of the lien.

Under this law you may not replevin the car to regain possession unless you were able to show the owner made state-

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. **MOTOR AGE** presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty problems as may be submitted to him.

ment to you to get you to relinquish your right of possession, he having no intention at the time to pay later. That is, his statements must amount to fraud on his part.

Ordinarily, you would have no right to attach the car in advance of judgment, unless the debtor were leaving the state, or seeking to hide his property to defraud his creditors.

If it is too late to file your statement of lien, and you cannot replevin for the lack of grounds of fraud, then your action will be one at law to recover on the account.

Responsibility of Garage Keeper For Negligence of Employee

WHAT is the responsibility of the garage owner for the negligence of his employee? The Supreme Court of Kansas has answered some important phases of the question in the suit of Howard against the Marshall Motor Co. of Wichita, Kan. Howard was injured by the negligent driving of one Miller, a porter in the employ of the motor company. Miller's duties included washing and cleaning cars, delivering them, and demonstrating cars, doing the driving. On the day of the accident Miller was told to go find a suitable porter and put him to washing a car which was then on the rack. Miller drove several blocks to a barber shop where he expected to find two men for the purpose. Not finding his men, he picked up a friend whom he invited to go on a spin on the return trip to the garage. The accident hap-



pened on a direct route to the garage and salesroom. He was driving along the street at a speed estimated at from 35 to 40 miles an hour when he ran into another car on a cross street with such violence as to drive it upon the sidewalk injuring Howard.

The motor company defended on the ground that at the time of the injury the evidence showed that Miller was not engaged in the service of his employer, but that instead he was driving for his own pleasure.

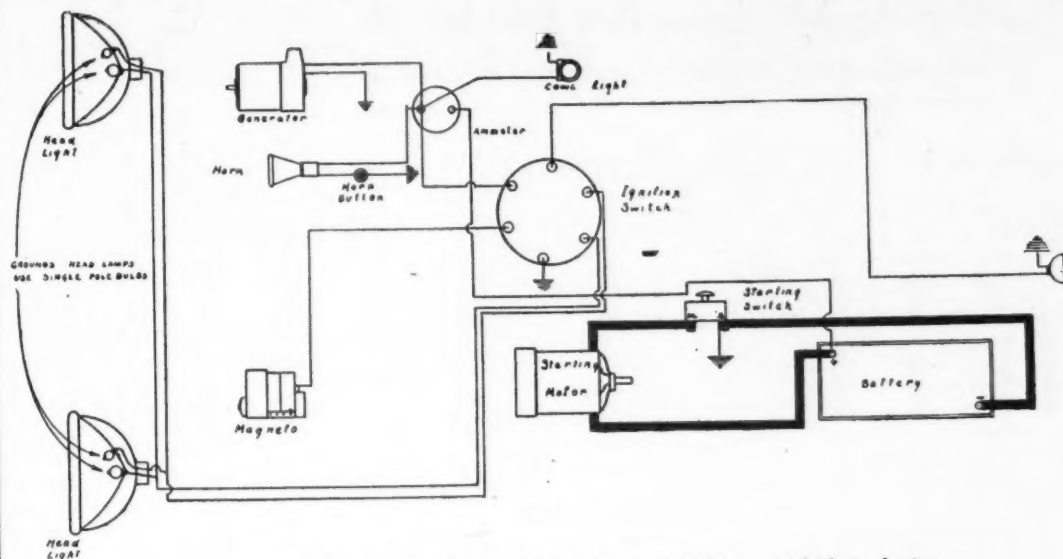
Much of the evidence was contradictory but from the verdict it must be assumed that Miller at the time of the accident was driving the car while upon an errand for his employers, being on his return to the garage after having made the trip upon which he had gone in their behalf. In that situation, says the court, there can be no doubt of the liability of the garage owner for the consequence of his negligent driving. For in returning with the car to the garage, Miller was as much in his employer's service as while he was on the outbound part of the journey.

And the fact that the employee took a friend on board to enjoy with him the pleasure of a run in violation of the speed limit, does not affect the legal aspect of the matter. He was, of course, disregarding his duty to his employer in the way he managed the car, but his misconduct was in doing in a wrongful manner what he was employed to do properly—he was acting within the scope of his employment. The court says that if there had been a deviation from the direct line of travel on a return to the garage, the defendant's liability might have been affected according to the particular circumstances. Miller's asking and allowing a friend to ride with him, such conduct not having been forbidden and not having been the cause of the accident, could not affect the liability of the employer.

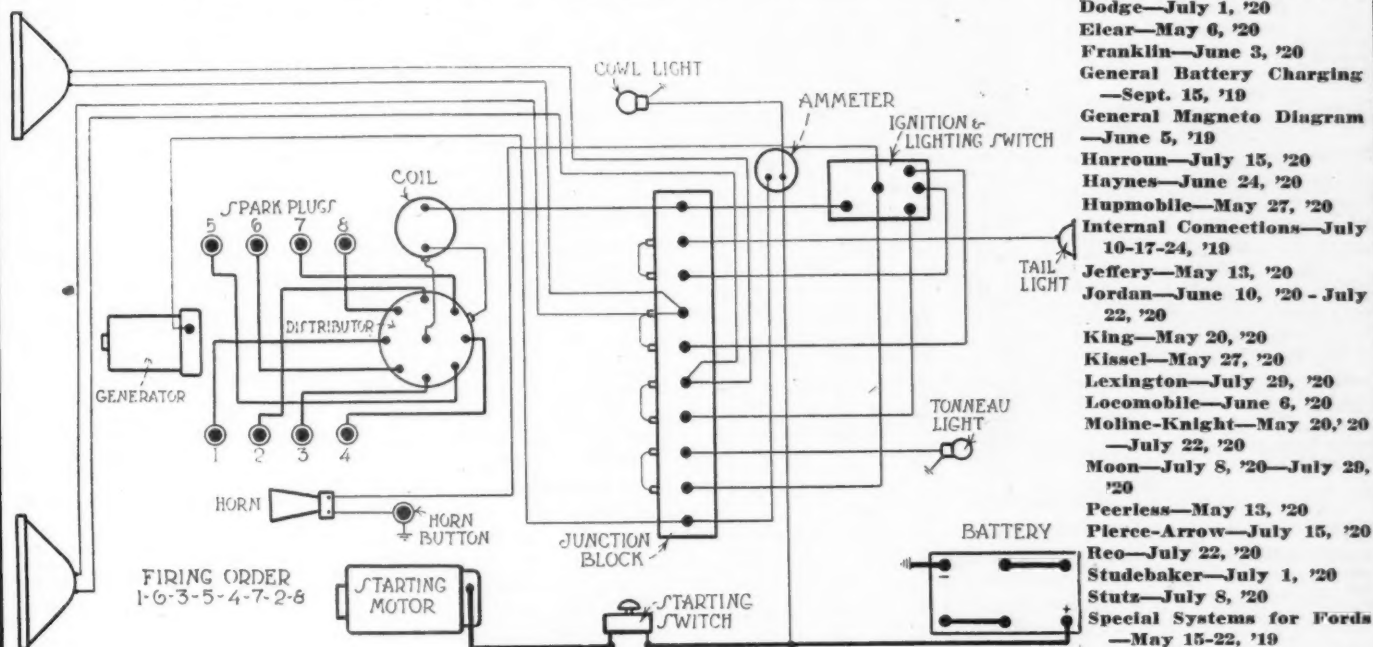
AIR MAIL ROUTE TO DENVER

Kansas City, Aug. 4—An air mail route may be established between this city and Denver, an investigation just completed by W. B. Webb, chief railway mail clerk, showing that the cost of such a service would be no more than the present expense of carrying mail by railroad. Under the law planes may be used for carrying mail where such a condition exists. Through the proposed system the mails would be advanced from twelve to twenty-four hours.

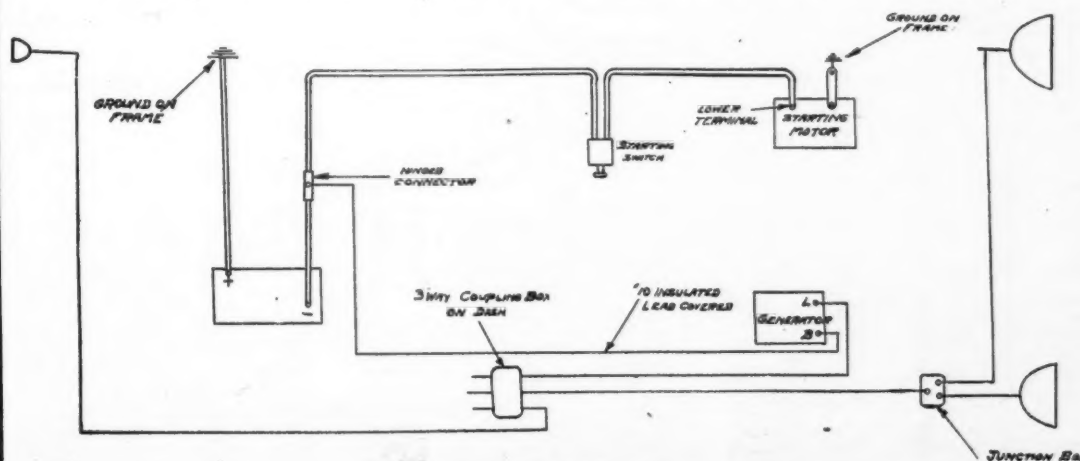
Motor Age Weekly Wiring Chart No. 89



1919 Roamer—Wiring used on cars numbers 13127 to 13869 inclusive



1918 1919 1920 APPERSON 8-18 A 8-19 8-20 BIUR STARTING & LIGHTING & REMY IGNITION



1915 Case 25—Bosch system

Name of car and date on which wiring diagrams have appeared in previous issues

Allen—June 17, '20
 Briscoe—May 6, '20
 Buick—July 15, '20
 Chalmers—June 17, '20
 Chandler—May 20, '20
 Cole—June 10, '20
 Crow-Elkhart—July 29, '20
 Dodge—July 1, '20
 Elcar—May 6, '20
 Franklin—June 3, '20
 General Battery Charging—Sept. 15, '19
 General Magneto Diagram—June 5, '19
 Harroun—July 15, '20
 Haynes—June 24, '20
 Hupmobile—May 27, '20
 Internal Connections—July 10-17-24, '19
 Jeffery—May 13, '20
 Jordan—June 10, '20 - July 22, '20
 King—May 20, '20
 Kissel—May 27, '20
 Lexington—July 29, '20
 Locomobile—June 6, '20
 Moline-Knight—May 20, '20 - July 22, '20
 Moon—July 8, '20 - July 29, '20
 Peerless—May 13, '20
 Pierce-Arrow—July 15, '20
 Reo—July 22, '20
 Studebaker—July 1, '20
 Stutz—July 8, '20
 Special Systems for Fords—May 15-22, '19

Tire and Rim Sizes

Motor Age Maintenance Data Sheet No. 108

One of a series of weekly pages of information
valuable to service men and dealers—save this page

1920 Models

Name—Model	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim	Name—Model	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Ace, TL.....	Firestone	32x4	SS	Dem	Firestone	La Fayette.....	Firestone	33x5	SS	SS	Firestone
Allen, Series 43.....	Miller	32x4	SS	SS	Stanweld	Lexington, S 20.....	Goodyear	32x4	SS	SS	Kelsey
American Six, C.....	Goodrich	32x4	SS	SS	Firestone	Liberty, 10-C.....	Goodyear	32x4	SS	SS	Firestone
American Beauty, 6-55.....	Firestone	33x4	SS	SS Dem	Firestone	Locomobile, 43.....	Goodyear	35x5	SS	SS	Firestone
Anderson, 30.....	Goodrich	33x4	SS	Dem SS	Firestone	Lorraine.....	{ Republic Goodyear } Goodrich	32x4	SS	SS	Stanweld
Apperson, 821-S.....	Goodyear	34x4 1/2	SS	SS	Firestone	Maibohm, B.....	Fisk	32x4	SS	SS	Stanweld
Apperson, Anniversary.....	Goodyear	34x4 1/2	SS	SS	Firestone	Marmion, Closed Cars, 34 B ...	Goodrich	32x4 1/2	SS	SS	Stanweld
Argonne, 1920.....	Silvertown	34x4 1/2	SS	SS	Firestone	Marmion, Touring, 34 B.....	Goodyear	33x5	SS	SS	Stanweld
Auburn, 639 H-K.....	Goodyear	33x4	SS	Dem	Firestone	Maxwell, 25.....	{ U. S. Goodyear } Goodrich	30x3 1/2 31x4 32x4 1/2	CQ Dem	C Dem	Maxwell
Biddle, H.....	{ Firestone Goodrich } Miller	32x4	SS	SS	Firestone	McFarlan, 127.....	{ U. S. Goodyear } Goodrich	31x4 32x4 1/2 34x4 1/2	SS	SS	Firestone
Bour-Davis, 21S.....	Goodyear	33x4 1/2	SS	SS	Firestone	Mercer, Series 5.....	Goodyear	32x4 1/2	SS	Q Dem	Optional
Brewster, 1920.....	Goodyear	34x4 1/2	SS	SS	Firestone	Metz, M 6.....	Goodrich	32x4	SS	Dem SS	Firestone
Briscoe, 4-34.....	{ Miller Firestone } Goodyear	31x4	QD	Dem	Hayes	Mitchell, F-40.....	{ U. S. Miller } Goodyear	33x4 32x4 1/2	SS Opt	Dem	Stanweld
Buick, K6-45.....	Goodyear	33x4	SS	SS	Own	Monroe, 8-9 and 8-10.....	Goodyear	32x3 1/2	SS	SS	Firestone
Buick, K6-49.....	Goodyear	34x4 1/2	SS	SS	Own	Moon, 6-48.....	Miller	32x4	SS	SS	Firestone
Birch, 40.....	Goodrich	32x4	Dem SS	SS	Stanweld	Moore, 30 G.....	Firestone	30x3 1/2	CQ Dem	C Dem	Firestone
Cadillac, 59.....	Goodyear	34x4 1/2	SS	SS	Kelsey	Nash, 682.....	Optional	33x4	SS	SS	Firestone
Cadillac, 59.....	Goodyear	35x5	SS	SS	Kelsey	Nash, 681-6.....	Optional	33x4	SS	SS	Firestone
Chalmers, 6-30.....	Optional	32x4	SS	SS	SS	National, Sextet, B B.....	Optional	32x4 1/2	SS	SS	Firestone
Champion.....	Goodrich	32x3 1/2	SS	SS	Stanweld	Nelson, D.....	Goodyear	32x4	SS	SS	Kelsey
Chandler, 27.....	Goodyear	{ 34x4 34x4 1/2 }	SS	Dem SS	Firestone	Oakland, 34-C.....	Goodyear	32x4	SS	SS	Jaxon
Case, V.....	Goodyear	34x4 1/2	SS	SS	{ Firestone, Type E }	Oldsmobile, 45-B.....	Goodyear	33x4 1/2	SS	SS	Jaxon
Chevrolet, 490.....	Goodyear	{ 30x3 1/2 31x4 }	C	C	Jaxon	Oldsmobile, 37-A.....	Goodyear	32x4	SS	SS	Jaxon
Chevrolet, FB.....	Goodyear	33x4	SS	SS	Jaxon	Olympian, 45.....	Miller	32x3 1/2	SS	SS	Perliman
Cleveland, 40.....	Goodrich	32x4	SS	Dem	Firestone	Overland, Open Cars, 4.....	Federal	30x3 1/2	SS	SS	Stanweld
Cole, 870.....	{ Goodrich Firestone } Goodyear	33x5	SS	Dem	Firestone	Overland, Closed, 4.....	Fisk	31x4	SS	SS	Stanweld
Columbia, D-C and CS.....	Goodyear	32x4	SS	SS Dem	Firestone	Owen Magnetic, 60.....		35x5	QD	QD	Firestone
Comet, C-53.....	Firestone	33x4 1/2	SS	SS	Firestone	Packard, 335.....	Goodyear	35x5	SS	SS	{ Firestone Type C }
Commonwealth.....	Goodyear	32x4	SS	SS	Stanweld	Paige, 6-42.....	{ Firestone Goodyear } Firestone	32x4	SS	SS	Kelsey
Crow-Elkhart, L 53-55.....	Goodyear	32x4 1/2	SS	SS	Firestone	Paige, 6-55.....	Goodyear	33x4 1/2	SS	SS	Kelsey
Crow-Elkhart, H 53-55.....	Goodyear	34x4	SS	SS	Firestone	Pan, A.....	Miller	33x4	SS	SS	Firestone
Cunningham, V-4.....	Optional	35x5	SS	SS	Firestone	Peerless, 56.....	Goodyear	34x4 1/2	SS	Dem SS	Firestone
Daniels, "8" D 19.....	Goodyear	34x4 1/2	SS	SS	Firestone	Piedmont, 6-40.....	Goodyear	32x4	SS	SS	Firestone
Davis, 51-55.....	Goodyear	33x4	SS	SS	Firestone	Pierce-Arrow, 31.....	Firestone	34x4 1/2	Optional	Optional	Firestone
Dixie Flyer, H-S-70.....	Fisk	32x4	SS	SS	Fisk	Pierce-Arrow, 51.....	Firestone	34x4 1/2	Optional	Optional	Firestone
Dodge Brothers.....		32x3 1/2	SS	SS	Kelsey	Pilot, 6-45.....	Miller	32x4	SS	SS	Stanweld
Douglas, G 18.....	Firestone	34x4	SS	SS	Firestone	Premier, 6-D.....	Optional	32x4 1/2	SS	Dem SS	Firestone
Dorris, 6-80.....	{ Goodyear Goodrich } Goodyear	33x5	QD	SS	Firestone	R. & V. Knight, R.....	{ Goodrich Firestone } Goodrich	32x4 1/2	SS	SS	Firestone
Dort, 15.....	Goodyear	30x3 1/2	C	C	{ Cleveland Welding Co. }	R. & V. Knight, J.....	Firestone	32x4 1/2	SS	SS	Firestone
Du Pont, A.....	Goodrich	32x4 1/2	SS	Dem SS	Stanweld	Reo, S-6.....	Goodrich	33x4	SS	SS	Firestone
Economy, 646.....	Goodrich	33x4	SS	SS	Firestone	Revere, C.....	{ Goodrich Silvertown } Goodyear	32x4 1/2	SS	SS	Houk Wheel
Elcar, 4.....	Firestone	33x4	SS	SS	Stanweld	Roamer, C-6-54.....	Firestone	32x4 1/2	SS	SS	Hayes Wheel
Elcar, 6.....	Firestone	33x4	SS	SS	Firestone	Roamer, E-4-75.....	Goodyear	32x4 1/2	SS	SS	Hayes Wheel
Elgin, K.....	Firestone	32x4	SS	SS	Kelsey	Saxon, 125.....		32x4	SS	SS	Firestone
Essex, A.....		32x4	SS	SS	SS	Sayers, Six-SP.....	Goodyear	33x4	SS	SS	{ Cleveland Welding }
Ford, T.....		30x3 1/2	C	C	Own	Scripps-Booth, Six-B.....	Goodyear	32x4	SS	SS	Kelsey
Franklin, S 9-B.....	Goodyear	32x4	SS	SS	Goodyear	Seneca, L 20.....	Miller	30x3 1/2	C	C SS	Jaxon
Gardner, G.....	Goodyear	32x3 1/2	SS	SS	Jaxon	Standard, I.....	Firestone	34x4 1/2	{ Q Dem SS }	Dem	Firestone
Geronimo, 6-E-45.....	Firestone	33x4 1/2	SS	SS	Firestone	Stearns Knight, SKL 4.....	Goodrich	34x4 1/2	SS	SS	Firestone
Grant Six, HX.....	{ U. S. Goodrich } Firestone	32x4	SS	SS	Firestone	Stephens, 80.....	Fisk	33x4 1/2	SS	SS	Stanweld
Haynes, 45.....	Goodyear	34x4 1/2	SS	SS	Firestone	Studebaker, EJ-40.....	{ Goodrich Goodyear } Firestone	{ 33x4 1/2 32x4 }	SS	SS	Kelsey
Haynes, 47.....	Firestone	32x4	SS	SS	Firestone	Studebaker, EH-50.....	Goodyear	33x4 1/2	Q Dem	Dem	
Huffman Six, R.....	Goodrich	32x4 1/2	SS	SS	Firestone	Studebaker, EG-60.....	Goodyear	33x4 1/2	SS	SS	Kelsey
H. C. S.....	Goodrich	33x4	SS	SS	Firestone	Stutz, H.....	{ Silvertown U. S. Cord }	32x4 1/2	SS	SS	Stanweld
Hollier, 206-B.....	Goodyear	34x4 1/2	SS	SS	{ Firestone Type E }	Templar, A-445.....	Firestone Cord	32x4	SS	SS	Firestone
Holmes.....	Goodyear	34x4 1/2	SS	SS	Kelsey	Texas.....	Southland	33x4	SS	SS	Firestone
Hudson, O.....	Optional	34x4 1/2	SS	SS	Kelsey	Tulsa, E-1.....	Firestone	33x4	SS	Dem SS	Stanweld
Hupmobile, R.....	Goodyear	32x4	SS	SS	SS	Velie, 48.....	Goodyear	32x4	SS	SS	Firestone
Jackson, 638.....	Goodyear	33x4	SS	SS	Jaxon	Velig, 34.....	Goodyear	32x3 1/2	SS	SS	Firestone
Jones, 28.....	Goodrich	32x4 1/2	SS	SS	Firestone	Vogue, 655.....	Goodrich	32x4	SS	SS	Firestone
Jordan, F.....	{ Goodrich Silvertown } Goodyear	32x4	SS	SS	Firestone	Vogue, 666.....	Goodrich	33x4 1/2	SS	SS	Firestone
Jordan, M.....	Goodyear	32x4	SS	SS	{ Firestone Type E }	Wasp.....	Firestone Cord	33x5	SS	SS	Firestone
Kling, H.....	Firestone	32x4 1/2	SS	Dem SS	Stanweld	Westcott, C-48.....	Firestone	32x4 1/2	SS	SS	Firestone
Kling, 8.....	Firestone	32x4 1/2	SS	Dem	Stanweld	Westcott, C-38.....	Firestone	33x4	SS	SS	Firestone
Kimel Kar, 45.....	{ Firestone Goodyear } Goodyear	32x4 1/2	QD	Dem	Firestone	Willy-Knight, 20.....	Fisk Cord	33x4	SS	SS	Stanweld
Kline Kar, 6-55-J.....	Goodyear	33x4	SS	SS	Firestone	Winther, 61.....	Goodrich	33x4	SS	SS	Firestone
						Winton Six, 25.....	Standard	35x5	SS	C	Firestone

ABBREVIATIONS—S.S., Straight Side; Q.D.C., Quick Demountable Clincher; Dem., Demountable; Q.D.D., Quick Demountable Detachable; C., Clincher.

The Automotive Repair Shop

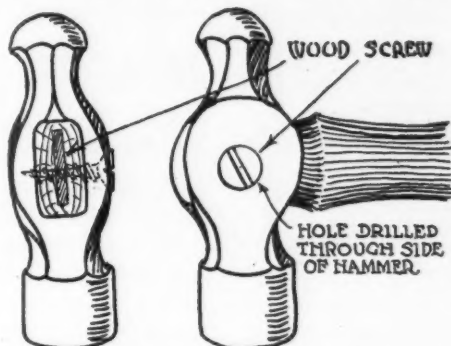
Practical Maintenance Hints

Screw Fastening for Hammer Handle

A cautious mechanic devised a hammer recently on which he uses a screw for the prevention of the hammer head from flying off.

At one side of the handle, a small drilled hole was made and after wedging the handle into place, the screw is inserted as a supplementary means of holding the head additional to be a safety precaution.

In explanation of the feature it was brought out that a severe accident to another workman some time previously justified making all of his hammers safe.



Securing the hammer head

Disposing of Waste Oil

The problem of disposing of oils taken out of transmission cases was causing the Tate-Gillhan Co., St. Louis, much worry and expense.

It was costing them from \$6 to \$8 a week to haul away the waste oil, to say nothing of the labor required in the handling of this hitherto useless commodity.

Mr. Tate finally hit upon an idea. Oil, even waste oil, will burn, and with coal going sky high, he bethought himself of the idea of using this waste oil as a fuel. He not only would save the hauling charges, mounting into several hundred dollars during a year, but at the same time, if he could get this oil to the furnace, he would make a hotter fire, a quicker fire, and he would save hundreds of dollars on the coal bill.

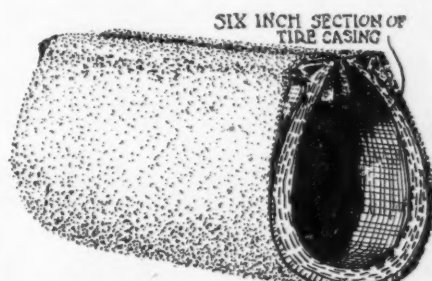
So mechanics built an immense iron drum. Into this drum was placed the waste oil from the transmission cases, and from the drum the waste oil was piped into the furnace in the cellar.

It was found that the waste oil accumulation amounted to from six to eight barrels per week, and during a long hard winter they not only saved the hauling bill, but found the commodity excellent for furnace purposes. This fuel-saving scheme is not copyrighted.

Handling Sandpaper or Emery Cloth

A six-inch section of an old tire makes a serviceable holder, for a sheet of sand paper or emery cloth, that is available in the garage or tire shop.

The abrasive cloth or paper can be held on with tire cement, rubber bands or with the hands when using. The rubber surface of the tire makes an excellent surface for the abrasive material and avoids bruising or cutting the knuckles as is common when the hand is used without a backing for the cloth or paper. This tool will be found useful for patching tires, cutting rust from rims, sanding down preparatory to painting or wherever any surface is to be cleaned of rust or polished.



A SIX INCH SECTION OF A DISCARDED TIRE MAKES A SERVICEABLE HOLDER FOR SHEET OF SAND PAPER OR EMERY CLOTH FOR GARAGE OR SHOP USE

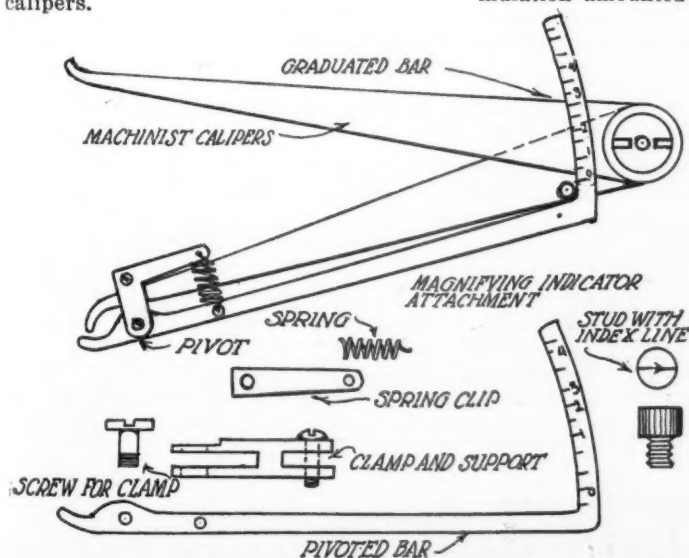
Magnifying Indicator for the Calipers

Small variations in the diameters of a cylinder on the inside or at the outside are difficult to detect with an ordinary pair of calipers.

In the sketch an indicator is shown which magnifies the measurement and detects the variations in these diameters. This feature consists of a detachable attachment for an ordinary pair of machinist's calipers having a bearing point protruding beyond the caliper end.

This bearing point is a part of a pivoted bar with a graduated scale on the upper end. An index line is made on a small drilled stud near the hinge of the caliper. A light spring on the pivoted bar holds the point out until a measurement is made when the scale moves across the index noting the variations in the work being calipered.

While the sketch shows the assembly of the indicator the size should be made in accordance with the size of the calipers.



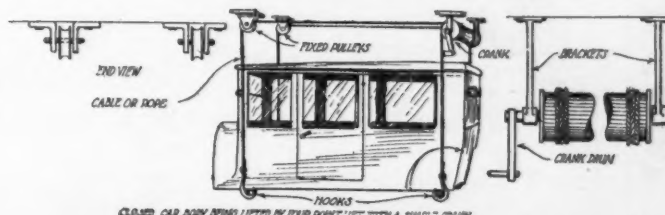
Magnifying indicator for the calipers

Four Point Lift with a Single Crank

A hoist which lifts uniformly at four points with the use of a single hand crank, is depicted in the illustration.

A single winding drum with a crank handle, two flanged pulley wheels and four sections of rope or cable are the materials needed for this construction. All ropes or cables are secured to the winding drum, which when turned winds the rope up uniformly. Four hooks on the ends of the cables provides a hoist suitable for use in the garage for lifting closed car bodies from the chassis.

Similarly the hoist can be used for lifting any machinery or equipment that is too large for a single hook and to be held horizontally when being lifted.



Hoist which will lift a body uniformly at four points with single hand crank

Motor Age Monthly Passenger Car Specification Tables

These prices apply to five and seven-passenger models only.

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. HP.	Carburetor Size and Make	Gear Ratio	Clutch	Gearbox	Universal	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Ace T. L.	5	2050	115	32x4	Firestone	31x5	H-S	6	25.35	11-Strom.	4.50	Detlaiff	Warner	Detroit	Spence	Gemmer	Stewart	Firestone	6	170	U. S. L.	A-J	A-L	A-K	6	Ace T. L.
Allen 43	5	1595	110	32x4	Miller	31x5	H-S	6	19.60	11-Strom.	4.60	B. and B.	Warner	Detroit	Columbia	Warner	Stewart	Firestone	6	100	U. S. L.	West.	G. & D.	Conn.	6-8	Allen 43
American C	5	2295	127	32x4	Firestone	31x5	H-S	6	25.35	11-Strom.	4.50	B. and B.	Warner	Detroit	Timken	Standard	Warner	Firestone	6	110	Willard	West.	West.	A-K	6-8	American C
American Beauty	5	2450	121	33x4	Firestone	31x5	H-S	6	25.35	11-Ray.	4.90	B. and B.	Durston	Acme	Timken	Standard	Warner	Firestone	6	111	Willard	West.	West.	A-K	6	American Beauty
Anderson Series 30	5	2145	120	33x4	Goodrich	31x4	Cont.	6	25.35	Ray.	4.50	B. and B.	Warner	Detroit	Salisbury	Jacox	Stewart	Firestone	6	111	Willard	West.	West.	Remy	6	Anderson Series 30
Apperson Anniversary	7	4250	130	34x4	U. S.	31x5	Cont.	8	33.80	11-John.	4.25	B. and B.	Warner	Detroit	Own	Own	Stewart	Firestone	6	110	Willard	West.	West.	Remy	6	Apperson Anniversary
Apperson 8-20	7	3500	130	34x4	Goodrich	31x5	Cont.	8	33.80	11-John.	4.25	B. and B.	Warner	Detroit	Own	Own	Stewart	Firestone	6	110	Willard	West.	West.	Remy	6	Apperson 8-20
Auburn 6-39	5	1895	120	33x4	Goodrich	31x4	Cont.	6	25.35	1-Ray.	4.66	B. and B.	Warner	Detroit	Col.	Jacox	Stewart	Firestone	6	80	Willard	West.	West.	Remy	6	Auburn 6-39
Beggs 6	5	2150	120	33x4	Goodrich	31x4	Cont.	6	25.35	1-Ray.	4.66	B. and B.	Warner	Detroit	Col.	Jacox	Stewart	Firestone	6	100	Exide	A-L	A-L	Conn.	6	Beggs 6
Bel	6	1495	114	31x4	Miller	31x4	C. B. & S.	4	22.50	1-Strom.	4.50	Warner	Warner	Detroit	Stan-Par	Warner	Stewart	Firestone	6	90	Phila.	A-L	G. & D.	A-K	6	Bel
Biddle B-5	6	3950	125	32x4	Firestone	31x5	Buda	6	22.50	11-Zen.	4.50	Warner	Warner	Detroit	Stan-Par	Warner	Stewart	Firestone	6	90	Phila.	A-L	G. & D.	A-K	6	Biddle B-5
Bour Davis 20	5	1800	118	32x4	Goodrich	31x4	Cont.	6	25.35	11-Strom.	4.75	B. and B.	Warner	Detroit	Salisbury	C. A. S.	Stewart	Firestone	6	115	Willard	West.	West.	Remy	6	Bour Davis 20
Bour Davis 21 S. & R.	7	2875	126	33x4	Goodrich	31x5	Cont.	8	29.40	11-Zen.	4.50	Muncie	Warner	Detroit	Salisbury	Lavine	Stewart	Firestone	12	110	U. S. L.	U. S. L.	U. S. L.	West.	6	Bour Davis 21 S. & R.
Brewster	4	9000	125	34x4	Kelly-S	4x5	Own	4	25.60	11-Strom.	4.50	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	80	Phila.	A-L	A-L	Conn.	6	Brewster
Briscoe 4-34	5	1285	109	31x4	optional	31x5	Own	4	18.23	1-	4.18	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	80	Phila.	A-L	A-L	Conn.	6	Briscoe 4-34
Buick K-6-45	5	1595	118	33x4	Goodrich	31x4	Own	6	27.34	-Mar.	4.00	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6-8	Buick K-6-45
Buick K-6-49	5	1865	124	34x4	Goodrich	31x4	Own	6	27.34	-Mar.	4.00	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6-8	Buick K-6-49
Cadillac 59	7	3940	132	35x5	optional	31x5	Own	8	31.25	11-Own*	5.07	B. and B.	Warner	Detroit	C-Tink.	Jacox	Stewart	Firestone	6	118	Willard	West.	West.	Delco	6-3	Cadillac 59
Case V	7	2650	126	34x4	Goodrich	31x5	Cont.	6	29.40	11-Ray.	4.45	Own	Warner	Detroit	Col.	Own	Stewart	Firestone	6	108	Willard	West.	West.	Delco	6	Case V
Chalmers 35-C	5	1945	117	32x4	optional	31x4	Own	6	25.35	-Zen.	4.25	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	108	Willard	West.	West.	Delco	6	Chalmers 35-C
Chalmers 35-B	5	2095	122	33x4	optional	31x4	Own	6	25.35	-Zen.	4.25	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	108	Willard	West.	West.	Delco	6	Chalmers 35-B
Champion C-4	5	1350	116	32x3	Goodrich	31x5	H-S	4	19.60	1-Zen.	4.25	B. and B.	Warner	Detroit	Peru	C. A. S.	Stewart	Firestone	6	80	Phila.	A-L	A-L	Conn.	6	Champion C-4
Champion S-4	5	1550	118	32x4	Goodrich	31x5	H-S	4	19.60	1-Zen.	4.25	B. and B.	Warner	Detroit	Peru	C. A. S.	Stewart	Firestone	6	80	Phila.	A-L	A-L	Conn.	6	Champion S-4
Chandler	7	1895	123	33x4	Goodrich	31x5	Own	6	29.40	11-Ray.	4.40	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	105	Willard	West.	West.	Delco	6	Chandler
Chevrolet 4-90	5	795	102	31x4	Goodrich	31x4	Own	6	21.60	1-Strom.	4.45	B. and B.	Warner	Detroit	Own	Own	Stewart	Firestone	6	80	Willard	West.	West.	Delco	6	Chevrolet 4-90
Chevrolet F. B.	5	1295	110	33x4	Goodrich	31x5	Own	4	27.10	11-Zen.	4.62	Own	Warner	Detroit	Own	Own	Stewart	Firestone	6	80	Willard	West.	West.	Delco	6	Chevrolet F. B.
Cleveland 40	5	1485	112	32x4	Goodrich	3x4	Own	6	21.60	1-Strom.	4.45	B. and B.	Warner	Detroit	Own	Own	Stewart	Firestone	6	80	Willard	West.	West.	Delco	6	Cleveland 40
Climber 4	5	1550	117	33x4	Goodrich	31x5	Cont.	4	19.60	1-Strom.	4.80	B. and B.	Warner	Detroit	Adams	Warner	Stewart	Firestone	6	120	Willard	West.	West.	A-K	6	Climber 4
Climber 6	7	2450	120	33x4	Goodrich	31x5	Cont.	6	25.35	-Strom.	4.75	B. and B.	Warner	Detroit	Timken	Warner	Stewart	Firestone	6	120	Willard	West.	West.	A-K	6	Climber 6
Cole Aero Eight 870	7	3250	127	33x5	Firestone	31x4	North.	8	39.20	11-John.	4.45	North.	Warner	Detroit	Timken	Warner	Stewart	Firestone	6	120	Willard	West.	West.	A-K	6	Cole Aero Eight 870
Columbia C	5	1895	115	32x4	Firestone	31x4	Cont.	6	25.35	11-Strom.	4.75	B. and B.	Warner	Detroit	Timken	Warner	Stewart	Firestone	6	105	Willard	West.	West.	A-K	6	Columbia C
Comet C-53	5	2350	125	33x4	Firestone	31x5	Cont.	6	29.40	11-Strom.	4.66	B. and B.	Warner	Detroit	Col.	Warner	Stewart	Firestone	6	120	Willard	West.	West.	A-K	6	Comet C-53
Commonwealth 4-40	5	1495	117	32x4	Goodrich	31x5	Lyco.	4	19.60	1-Carter	4.25	B. and B.	Warner	Detroit	Peru	C. A. S.	Stewart	Firestone	6	105	Willard	West.	West.	A-K	6	Commonwealth 4-40
Crawford 20-6-40	7	3000	124	32x4	Firestone	31x5	Cont.	6	29.40	1-Strom.	4.25	B. and B.	Warner	Detroit	Timken	Warner	Stewart	Firestone	6	105	Willard	West.	West.	A-K	6	Crawford 20-6-40
Crow-Ellhart L-55-4	5	1395	117	32x3	Firestone	31x5	Lyco.	4	19.60	1-Zen.	4.25	B. and B.	Warner	Detroit	Peru	C. A. S.	Stewart	Firestone	6	80	Exide	Dyn.	Dyn.	Conn.	6	Crow-Ellhart L-55-4
Crow-Ellhart H-55-6	5	1645	117	33x4	Firestone	31x5	Ruten.	4	23.4	-Zen.	4.25	B. and B.	Warner	Detroit	Peru	C. A. S.	Stewart	Firestone	6	80	Exide	Dyn.	Dyn.	Conn.	6	Crow-Ellhart H-55-6
Cunningham V-4	7	4850	132	34x4	optional	31x5	Own	8	45.00	11-Strom.	4.08	Own	Warner	Detroit	Timken	Warner	Stewart	Firestone	6	145	Willard	Delco	Delco	Delco	6	Cunningham V-4
Daniels D	5	2185	120	33x4	Goodrich	31x4	Cont.	6	25.35	11-Strom.	4.40	Own	Warner	Detroit	Timken	Warner	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Daniels D
Davis 51	5	1595	112	32x4	Firestone	31x5	H-S	4	19.60	1-Strom.	4.75	B. and B.	Warner	Detroit	Timken	Warner	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Davis 51
Divis Flyer H-5-70	5	1185	114	32x3	optional	31x4	Own	4	24.03	11-Stew.	4.16	Own	Warner	Detroit	Own	Own	Stewart	Firestone	12	130	Willard	N. E.	N. E.	Own	12	Divis Flyer H-5-70
Dodge Brothers	7	4350	132	33x5	Goodrich	4x5	Own	6	38.40	11-Strom.	3.50	Warner	Warner	Detroit	Timken	Ross	Stewart	Firestone	6	95	U. S. L.	West.	West.	Conn.	6	Dodge Brothers
Doris 6-80	7	1055	105	30x3	Goodrich	31x5	D-Lyco	4	19.60	1-Strom.	4.07	Own	Warner	Detroit	Timken	Jacox	Stewart	Firestone	6	130	Willard	West.	West.	Conn.	6	Doris 6-80
Dort 15	5	4000	124	32x4	Goodrich	31x5	Cont.	6	25.35	1-Zen.	4.45	Own	Warner	Detroit	Col.	Jacox	Stewart	Firestone	6	103	Exide	West.	West.	Eise.	6	Dort 15
du Pont A	5	1895	115	33x4	Goodrich	31x4	Cont.	6	25.35	11-Strom.	4.50	B. and B.	Warner	Detroit	Salisbury	C. A. S.	Stewart	Firestone	6	90	Willard	A-L	A-L	Conn.	6	du Pont A
Economy 6-46	5	1795	116	33x4	Firestone	31x4	Cont.	6	25.35	11-Strom.	4.50	B. and B.	Warner	Detroit	Salisbury	C. A. S.	Stewart	Firestone	6	90	Willard	A-L	A-L	Conn.	6	Economy 6-46
Elcar 6	5	1495	116	33x4	Firestone	31x5	Lyco.	4	19.60	1-Strom.	4.50	B. and B.	Warner	Detroit	Salisbury	C. A. S.	Stewart	Firestone	6	90	Willard	Delco	Delco	Delco	6	Elcar 6
Elcar 4	5	1495	116	33x4	Firestone	31x5	Lyco.	4	19.60	1-Strom.	4.50	B. and B.	Warner	Detroit	Salisbury	C. A. S.	Stewart	Firestone	6	90	Willard	Delco	Delco	Delco	6	Elcar 4

Engine—Ruten, Ruten; Cont., Continental; Weid, Weid; North, North; H-S, Herschel-Spillman; Lyco, Lycoming; D-Lyco, Dort-Lycoming; G. B. & S., Golden, Bellman; Searis, T-McTeator-McFarlan; #, Monson or Dusenberry; R. & V., Root & Van Dervoort; Carburetor—Strom, Stromberg; Zen, Zenith; Ray, Rayfield; John, Johnson; Mar, Marvel; Sund, Sundman; Stew, Stewart; H-K, Holley-Kingston; Newc, Newcomb; Schob, Schobler; Tilot, Tiloton; Johns, Johnston. Fuel feed vacuum except where otherwise indicated. *Pressure. #Gravity. Generator and Motor—A-L, Auto-Lite; West, Westinghouse; #, Westinghouse or Auto-Lite; W-L, Ward-Leonard; Dyn, Dyneto; N. E., North East; L-N, Leese-Neville; A-C, Allis-Chalmers; Split, Splitdorf; S-H, Simma-Huff; G. & D., Gray & Davis. Ignition—A-K, Atwater-Kent; Conn, Connecticut; Eise, Eisemann; West, Westinghouse; Will, Willard; N. E., North East; K-Remy, Kingston-Remy; Berl, Berling; Bosch-W, Bosch-Weddinghouse; Split, Splitdorf. Gearset—G-L, Grant-Lee; North, Northway; B-L, Brown-Lipe. Rear Axle—Col, Columbia; W-Weiss, Walker-Weiss; C-Tink, Cadillac-Timken; West-Mott, Weston-Mott. Universal—Hart, Hartford; Ther-H, Thermoid-Hardy; U. M. Co., Universal Machine Co. Speedometer—J-Man, Johns-Manville; V-Sicklen, Van Sicklen; A-C, Allis-Chalmers.

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. H. P.	Carburetor Size and Make	Gear Ratio	Clutch	Connect	Universals	Rear Axle	Steering Gear	Speedometer	Flims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltage	Name and Model
Elgin Series K	5	1665 118	33x4	33x4	optional	31x4	Falls	6	23.44	1-Stron.	5.09	B. and B.	Mechanics	Mechanics	Col.	C. A. S.	V. Sicken	Freestone	6	90	Willard	Wagner	Wagner	Wagner	6	Elgin Series K
Essex A	5	1795 108	32x4	32x4	optional	31x5	Own	4	18.23	1-Stron.	5.09	Own	Own	Spicer	Col.	Gemmer	Stewart	Kelsey	6	105	Exide	Delco	Delco	Delco	6	Essex A
Fergus	6	126	32x4	32x4	optional	31x5	Cont.	6	25.35	-Zen.		B. and B.	G-L	Peters	Col.	Gemmer	Stewart	Freestone	6	120	Willard	L-N	L-N	Delco	6	Fergus
Ferris C-20	7	3675 130	32x4	32x4	Firestone	31x5	Own	6	29.40	-Zen.	4.75	Own	Own	Own	Own	Own	Stewart	Freestone	6	80	opt.	Own	Own	Marcelli	6	Ferris C-20
Ford T	7	136	35x5	35x5	optional	31x4	Own	6	22.50	1-H-K	3.63	Own	Own	Own	Own	Own	Stewart	Freestone	6	80	opt.	Own	Own	Marcelli	6	Ford T
Franklin 9-B	5	3100 115	32x4	32x4	Goodyear	31x4	Own	6	25.35	1-Stron.	4.33	B. and B.	Own	Own	Own	Own	Stewart	Freestone	6	60	Willard	Dyn.	West.	A-K	12	Franklin 9-B
Gardner	5	1195 112	32x4	32x4	Goodyear	31x5	Own	4	19.60	1-Carter	4.5	B. and B.	Own	Own	Own	Own	Stewart	Freestone	6	88	Exide	Dyn.	West.	Delco	15	Gardner
Geronimo	5	1995 122	32x4	32x4	Goodyear	31x5	Ruten.	6	23.44	1-Stron.	4.63	B. and B.	Own	Own	Own	Own	V. Sicken	Freestone	6	90	Pres.	Bijur	Bijur	A-K	6	Geronimo
Grant H-X	5	1750 116	32x4	32x4	optional	31x4	Walker	6	22.52	1-Stron.	4.63	B. and B.	Own	Own	Own	Own	Gemmer	Freestone	6	80	Pres.	Delco	Delco	A-K	6	Grant H-X
Hanson 54-A	5	2165 121	32x4	32x4	optional	31x4	Cont.	6	25.35	1-Mar.	4.00	B. and B.	Own	Own	Own	Own	Stewart	Kelsey	6	80	Pres.	Remy	Remy	Delco	6-8	Hanson 54-A
Harmon A-2	5	1195 106	30x3	30x3	Miller	31x5	Own	4	16.90	1-Stron.	4.00	B. and B.	Own	Own	Own	Own	Stewart	Freestone	6	80	Pres.	Remy	Remy	Delco	6-8	Harmon A-2
Harvard 4-20	2	850 100	28x3	28x3	...	31x5	H-S	4	19.60	-Zen.		B. and B.	Own	Own	Own	Own	Barnes	Freestone	6	...	Na'l	Dyn.	Dyn.	A-K	6-3	Harvard 4-20
Hayfield A-42	5	1695 115	32x4	32x4	Firestone	31x5	H-S	6	16.90	1-Zen.	4.12	B. and B.	Own	Own	Own	Own	Jacox	Freestone	6	120	Willard	L-N	L-N	Delco	6	Hayfield A-42
Haynes 48	7	3635 132	34x4	34x4	optional	31x5	Own	12	36.30	1-Ray.	4.77	B. and B.	Own	Own	Own	Own	Jacox	Freestone	6	120	Willard	L-N	L-N	Delco	6	Haynes 48
Haynes 47	7	2935 132	34x4	34x4	optional	31x5	Own	6	29.40	1-Ray.	4.77	B. and B.	Own	Own	Own	Own	Jacox	Freestone	6	120	Willard	L-N	L-N	Delco	6	Haynes 47
H. C. S. Special	4	2950 120	32x4	32x4	Goodyear	31x5	Weid.	6	21.03	-Stron.	4.41	Fuller	Fuller	Own	Own	Gemmer	Stewart	Freestone	6	80	U. S. L.	West.	West.	Delco	6	H. C. S. Special
Holler 206-B	7	3350 126	34x4	34x4	Goodyear	31x4	Own	6	29.40	1-New.	4.90	B-L	Own	Own	Own	Gemmer	Stewart	Freestone	6	80	U. S. L.	West.	West.	Delco	6	Holler 206-B
Holmes	7	2600 125	32x4	32x4	optional	31x5	Own	6	29.40	1-New.	4.45	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	105	Exide	Dyn.	Dyn.	Delco	12	Holmes
Hudson O	5	1995 120	32x4	32x4	Firestone	31x4	Cont.	6	25.35	1-Stron.	4.87	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	105	Exide	Dyn.	Dyn.	Delco	6	Hudson O
Huffman R	5	1995 120	32x4	32x4	Firestone	31x4	Cont.	6	25.35	1-Stron.	4.87	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	105	Exide	Dyn.	Dyn.	Delco	6	Huffman R
Hupmobile R	5	1685 112	32x4	32x4	Goodyear	31x5	Own	4	16.90	1-Stron.	4.87	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	90	Willard	West.	West.	A-K	6	Hupmobile R
Jackson 6-38	5	121	33x4	33x4	Goodyear	31x4	Cont.	6	25.35	1-Stron.	4.87	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	90	Willard	West.	West.	A-K	6	Jackson 6-38
Jacquet, Royal	5	124	33x5	33x5	Goodyear	31x4	Own	4	25.35	1-Stron.	4.87	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	130	U. S. L.	A-L	A-L	Remy	6	Jacquet, Royal
Jones 28	7	2750 126	32x4	32x4	Goodyear	31x5	Cont.	6	29.40	1-Ray.	4.50	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	120	Pres.	A-L	A-L	Delco	6	Jones 28
Jordan F	7	2975 127	32x4	32x4	Goodyear	31x5	Cont.	6	29.40	1-Ray.	4.50	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	118	Willard	Delco	Delco	Delco	6	Jordan F
Jordan M	5	2650 120	32x4	32x4	Goodyear	31x4	Cont.	6	25.35	1-Stron.	4.66	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	94	Willard	Delco	Delco	Delco	6	Jordan M
Kenworthy 6-55	5	5000 130	32x4	32x4	optional	31x5	Dusen.	4	25.60	1-Stron.	4.10	B-L	Own	Own	Own	Ross	Stewart	Freestone	6	140	Exide	West.	West.	Boch	6	Kenworthy 6-55
King H	7	2835 120	32x4	32x4	optional	31x5	Own	8	28.80	1-Ball	4.08	B-L	Own	Own	Own	Ross	Stewart	Freestone	6	120	Pres.	West.	West.	Boch	6	King H
Kissel	7	3475 124	32x4	32x4	Goodyear	31x5	Own	6	26.75	1-Stron.	4.25	B. and B.	Own	Own	Own	Jacox	Stewart	Freestone	6	120	Willard	Remy	Remy	Wagner	6	Kissel
Klinekar 6-55-J	5-7	2265 121	33x4	33x4	Goodyear	31x4	Cont.	8	33.80	2-Own*	4.50	B. and B.	Own	Own	Own	Wohrab	Stewart	Freestone	6	120	Willard	Remy	Remy	Wagner	6	Klinekar 6-55-J
LaFayette	7	132	33x5	33x5	Firestone	31x4	Own	8	33.80	2-Own*	4.50	B. and B.	Own	Own	Own	Wohrab	Stewart	Freestone	6	120	Willard	Remy	Remy	Wagner	6	LaFayette
Leach 20-A	5	5200 126	32x4	32x4	Goodyear	31x5	Cont.	6	29.40	-Ray.	4.50	B-L	Own	Own	Own	Liberty	Stewart	Freestone	6	180	Pres.	Delco	Delco	Delco	6-8	Leach 20-A
Lexington 8	5	2185 122	32x4	32x4	optional	31x4	Cont.	6	25.35	1-Ray.	4.66	B. and B.	Own	Own	Own	C. A. S.	Stewart	Freestone	6	100	Willard	G-D	G-D	Delco	6	Lexington 8
Liberty 10-C	5	1985 117	32x4	32x4	Goodyear	31x5	Own	6	23.44	1-Stron.	4.66	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	90	Willard	Wagner	Wagner	Wagner	6	Liberty 10-C
Locomobile 48	7	8900 142	35x5	35x5	optional	31x5	H-S	6	48.60	1-Stron.	3.80	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	140	Exide	West.	West.	West.	6	Locomobile 48
Lorraine	5	1575 114	32x4	32x4	Republic	31x5	Own	4	19.60	1-John.	4.75	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	94	U. S. L.	West.	West.	West.	6	Lorraine
Maibum B	5	1585 116	32x4	32x4	Fisk	31x4	Falls	6	23.44	1-Till.	4.50	B. and B.	Own	Own	Own	Bucyrus	Stewart	Freestone	6	94	Willard	Bijur	Bijur	A-K	6	Maibum B
Marmon 34	7	5000 136	32x4	32x4	optional	31x5	Own	6	33.75	1-Stron.	3.75	B. and B.	Own	Own	Own	Own	Stewart	Freestone	6	162	Willard	Delco	Delco	Delco	6	Marmon 34
Marshall K	5	1295 117	32x4	32x4	Firestone	31x5	Lycro.	6	19.60	1-Zen.	4.50	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	160	Willard	Dyn.	Dyn.	Delco	6	Marshall K
Maxwell 25	5	1155 109	30x3	30x3	...	31x4	Own	4	21.03	1-Stron.	4.50	B. and B.	Own	Own	Own	Own	Stewart	Freestone	6	87	...	...	...	...	6	Maxwell 25
McFarland 127	7	5100 136	35x5	35x5	Goodyear	31x4	T-McF	6	48.60	1-Stron.	3.58	B. and B.	Own	Own	Own	Wagner	Stewart	Freestone	6	120	Willard	West.	West.	West.	6	McFarland 127
Mercer Series 5	6	4950 132	32x4	32x4	optional	31x5	Own	6	48.60	1-Ball	3.60	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	182	Willard	West.	West.	West.	6	Mercer Series 5
Meteor K R	4	5500 129	32x4	32x4	optional	31x5	Dusen.	4	25.60	1-Zen.	4.41	B. and B.	Own	Own	Own	Gemmer	Stewart	Freestone	6	110	Willard	Bijur	Bijur	Simms	6	Meteor K R
Meta Master 6	5	1895 120	32x4	32x4	Goodyear	31x5	Own	6	23.44	1-Stron.	4.63	B. and B.	Own	Own	Own	Own	Stewart	Freestone	6	90	Willard	Remy	Remy	Conn.	6	Meta Master 6
Mitchell F-40	5	1750 120	32x4	32x4	...	31x5	Own	6	25.35	1-Ray.	4.41	B. and B.	Own	Own	Own	Own	Stewart	Freestone	6	110	Pres.	Dyn.	Dyn.	Conn.	6	Mitchell F-40
Monitor M & Ser. 3	5	2475 121	33x4	33x4	Miller	31x4	Cont.	6	25.35	1-Stron.	4.50	B. and B.	Own	Own	Own	C. A. S.	Stewart	Freestone	6	80	U. S. L.	A-L	A-L	Conn.	6	Monitor M & Ser. 3
Monroe 8-9	5	1440 115	32x3	32x3	Goodyear	31x4	Own	4	16.90	1-Zen.	4.66	B. and B.	Own	Own	Own	Warner	Stewart	Freestone	6	110	Exide	Delco	Delco	Delco	6	Monroe 8-9
Moore 6-48	5	2385 122	32x4	32x4	Miller	31x4	Cont.	6	25.35	1-Ray.	4.45	B. and B.	Own	Own	Own	Warner	Stewart	Freestone	6	110	Exide	Delco	Delco	Delco	6	Moore 6-48
Moore 6-68	7	2950 125	32x4	32x4	Miller	31x5	Cont.	6	29.40	1-Ray.	4.45	B. and B.	Own	Own	Own	Warner	Stewart	Freestone	6	110	Exide	Delco	Delco	Delco	6	Moore 6-68

Engines—Rutenber: Cont., Continental; Weid., Weidely; North, Northway; H-S, Herschell-Spillman; Lyco, Lycoming; D-Lyco, Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McTector-McFarlane; f, Monson or Dusenberg; R. & V., Root & Van Dervoort. Carburetor—Strom, Stromberg; Zen., Zenith; Ray, Rayfield; John, Johnson; Mar., Marvel; Sund, Sundman; Stew, Stewart; H-K, Holley-Kingston; Newe., Newcomb; Schab., Schabier; Tillot., Tillotson; John., Johnston. Fuel fed vacuum except where otherwise indicated. *Pressure. Generator and Motor—A-L, Auto-Lite; West., Westinghouse or Auto-Lite; W-L, Ward-Leonard; Dyn., Dyneto; N. E., North East; L-N, Leese-Neville; A-C, Allis-Chalmers; Splitt., Splittorf; S-H, Simms-Huff; G. & D., Gray & Davis. Ignition—A-K, Atwater-Kent; Conn., Connecticut; Elae., Elsemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berlin; Bosch-W., Bosch-Westinghouse; Splitt., Splittorf. Gearset—G-L, Grant-Less; North, Northway; B-L, Brown-Lips. Rear Axle—Col., Columbia; W-Weim, Walker-Weiss; C-Tink, Cadillac-Timken; West-Mott, Weston-Mott. Universal Machine Co. Speedometer—J-Man, John-Manville; V-Sicken, Van Sicken; A-C, Allis-Chalmers.

Motor Age Monthly Passenger Car Specification Tables

These prices apply to five and seven-passenger models only.

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. H. P.	Carburetor Size and Make	Gear Ratio	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model	
Moore 30.....	5	1175	108	30x34	Firestone	3x5	Own	4	14.40	1-Mar.	4.50	Detlaf.	G-L	U. P.	Peru	Ditweiler	Stewart	Firestone	6	80	Willard	A-L	A-L	Wagner	Conn.	6	Moore 30
Nash 681.....	5	1605	121	33x44	optional	3x5 1/2	Own	6	25.35	1-Mar.	4.50	B. and B.	Own	Own	Own	Gemmer	Stewart	Firestone	6	100	Willard	Wagner	Wagner	Wagner	6	Nash 681	
Nash 682.....	7	1875	127	34x44	optional	3x5 1/2	Own	6	25.35	1-Mar.	4.50	B. and B.	Own	Own	Own	Gemmer	Stewart	Firestone	6	100	Willard	Wagner	Wagner	Wagner	6	Nash 682	
National Sixty BB.....	7	3750	130	32x44	optional	3x5 1/2	Own	6	29.40	1-Ray.	4.08	B. and B.	B-L	Arvac	Col.	Warner	Warner	Firestone	6	110	Prent.	West.	West.	West.	6	National Sixty BB	
Nelson D.....	5	1700	104	32x44	Goodyear	3x4 1/2	Own	6	15.03	1-Ray.	4.25	Own	Own	Own	Own	Warner	Stewart	Firestone	6	12	Willard	U. S. L.	U. S. L.	Boech	12	Nelson D	
Noma 1-B.....	4	2000	128	32x44	Goodyear	3x4 1/2	Own	6	25.35	1-Zen.	4.45	B. and B.	Detroit	Spicer	Timken	Lavine	Stewart	Firestone	6	104	Willard	Delco	Delco	Delco	6	Noma 1-B	
Oakland 34-C.....	5	1235	115	32x44	Goodyear	2 1/2 x 4 1/2	Own	6	19.00	1-Ray.	4.50	Own	Muncie	Mechanics	Busch	Jacox	Stewart	Firestone	6	85	Prent.	Remy	Remy	Remy	6	Oakland 34-C	
Ogren 6-40.....	6	3750	132	33x55	Goodyear	3x5 1/2	Own	6	29.40	1-Ray.	4.10	Hoosier	Muncie	Hart	Col.	Lavine	Warner	Firestone	6	120	Willard	Bijur	Bijur	Bijur	6	Ogren 6-40	
Oldsmobile 37-A.....	5	1450	112	32x44	Goodyear	2 1/2 x 4 1/2	Own	6	18.99	1-John.	4.58	Own	Warner	Spicer	West-Mott	Jacox	Stewart	Firestone	6	80	Willard	Remy	Remy	Remy	6	Oldsmobile 37-A	
Oldsmobile 45-B.....	7	2045	122	33x44	Goodyear	2 1/2 x 4 1/2	Own	8	26.45	1-Ball.	4.91	B. and B.	Warner	Spicer	West-Mott	Jacox	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Oldsmobile 45-B	
Olympian 45.....	5	1585	112	32x44	Goodyear	3x4 1/2	Own	4	16.90	1-Strum.	4.50	B. and B.	Own	Detroit	Peru	Warner	Stewart	Firestone	6	80	Willard	U. S. L.	U. S. L.	Conn.	6	Olympian 45	
Overland 4.....	5	985	100	30x34	Flak	3x4 1/2	Own	4	18.23	1-Tillot. #	4.50	Own	Own	Own	Own	Own	Stewart	Firestone	24	80	U. S. L.	A-L	A-L	Conn.	6	Overland 4	
Owen-Magnetic 60.....	7	7000	142	35x55	optional	4x5 1/2	Own	6	38.40	1-Zen.	3.87	Own	Own	Spicer	Stan-Par.	Own	Waltham	Firestone	6	120	Willard	Exide	Own	Berl.	28	Owen-Magnetic 60	
Packard Twin Six.....	7	1770	119	32x44	optional	3x5	Own	12	43.20	1-Strum.	4.36	Own	Own	Spicer	Stan-Par.	Own	Waltham	Firestone	6	120	Willard	Bijur	Bijur	Delco	7	Packard Twin Six	
Paige 6-42.....	5	1770	119	32x44	optional	3x5	Own	6	23.44	1-Strum.	4.50	B. and B.	Own	Detroit	Salisbury	Jacox	Stewart	Firestone	6	108	Willard	G. & D.	G. & D.	A-K	6	Paige 6-42	
Paige 6-55.....	7	2400	127	33x44	optional	3x5 1/2	Own	6	29.40	1-Ray.	4.33	B. and B.	Own	Spicer	Salisbury	Jacox	Stewart	Firestone	6	108	Willard	G. & D.	G. & D.	A-K	6	Paige 6-55	
Paragon.....	7	1885	123	32x44	optional	3x5 1/2	Own	4	22.50	1-Ray.	4.25	Own	Own	Own	Own	Own	Stewart	Firestone	6-8	84	U. S. L.	Bijur	Bijur	Phil.	6	Paragon	
Parenti.....	5	1685	123	32x44	.....	3x4 1/2	Cameron	6	21.60	1-Zen.	4.50	B. and B.	Cameron	Ther-H	Own	Own	Stewart	Firestone	6-8	84	U. S. L.	Bijur	Bijur	Phil.	6	Parenti
Paterson 6-50.....	7	2130	120	33x44	optional	3x4 1/2	Own	6	25.35	1-Strum.	4.50	B. and B.	Own	Hartford	Stan-Par.	Jacox	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Paterson 6-50	
Peerless Series 6.....	7	3230	125	34x44	Goodyear	3x5 1/2	Own	8	33.80	1-Ball.	4.90	Own	Own	Spicer	Stan-Par.	Gemmer	Stewart	Firestone	6	125	Willard	A-L	A-L	A-K	6	Peerless Series 6	
Phauna R.....	5	9500	125	32x44	U. S.	3 1/2 x 6	Own	4	24.70	1-Strum.	4.45	Own	Own	Own	Own	Own	Warner	Firestone	6	90	Willard	W-L	W-L	Boech	6	Phauna R	
Piedmont 4-30.....	5	1485	116	32x44	Firestone	3x5 1/2	Lyc.	6	19.60	1-Carter	4.45	B. and B.	G-L	Hartford	Peru	Ditweiler	Stewart	Firestone	6	90	Willard	Delco	Delco	Dyn.	6	Piedmont 4-30	
Piedmont 6-49.....	5	1945	122	32x44	Firestone	3x4 1/2	Own	6	25.35	1-Strum.	4.45	B. and B.	Own	Hartford	Peru	Warner	Stewart	Firestone	6	90	Willard	Delco	Delco	Remy	6	Piedmont 6-49	
Pierce-Arrow 38.....	7	7250	134	34x44	Goodrich	4x5 1/2	Own	6	38.40	1-Strum.	3.78	Own	Own	Own	Own	Own	Waltham	Goodrich	6-8	135	Prent.	West.	West.	West.	6	Pierce-Arrow 38	
Pierce-Arrow 48.....	7	7750	142	35x55	Goodrich	4x5 1/2	Own	6	48.60	1-Strum.	3.53	Own	Own	Own	Own	Own	Waltham	Goodrich	6-8	135	Prent.	West.	West.	West.	6	Pierce-Arrow 48	
Pilot 6-45.....	5	1895	120	32x44	Miller	3x5 1/2	Testor	6	23.44	1-Tillot.	4.90	B. and B.	Own	Hart	Spacke	Ditweiler	Stewart	Standard	6	100	Prent.	Delco	Delco	Delco	6	Pilot 6-45	
Porter 46.....	7	9400	142	35x55	U. S.	4 1/2 x 6 1/2	Own	4	34.18	1-Zen.	3.00	M. and E.	Own	Peters	Stan-Par.	Own	Stewart	Firestone	12	120	Prent.	West.	West.	West.	12	Porter 46	
Premier 6-D.....	7	4600	126 1/2	32x44	Firestone	3x5 1/2	Own	6	27.34	1-John.	4.50	B. and B.	Own	Own	Own	Own	Warner	Firestone	6	120	Willard	Delco	Delco	Delco	6	Premier 6-D	
Reo T-6.....	5	1750	120	33x44	U. S.	3 1/2 x 5	Own	6	24.30	1-Ray.	4.66	Own	Own	Own	Own	Own	Stewart	Firestone	6	108	Willard	N. E.	N. E.	N. E.	6	Reo T-6	
Revere C.....	7	4650	131	32x44	optional	4x6	Duesenb'g	6	30.63	1-Strum.	3.44	B-L	Own	Spicer	Standard	Gemmer	Stewart	Firestone	6	120	Willard	W-L	W-L	Boech	6	Revere C	
Roamer C-6-54.....	7	3150	128	32x44	Goodyear	3x5 1/2	Own	6	29.40	1-Strum.	4.90	B. and B.	G-L	Ther-H	Stan-Par.	Jacox	Stewart	Firestone	6	117	Willard	Wagner	Wagner	Wagner	6	Roamer C-6-54	
R & V Knight J.....	7	3350	127	32x44	optional	3x4 1/2	Own	6	29.40	1-Strum.	4.90	B. and B.	B-L	Spicer	Timken	Jacox	Stewart	Firestone	6	117	Willard	Wagner	Wagner	Wagner	6	R & V Knight J	
R & V Knight R.....	7	2150	115	32x44	optional	3x5 1/2	Own	4	22.50	1-Strum.	4.75	B. and B.	B-L	Spicer	Salisbury	Jacox	Stewart	Firestone	6	117	Willard	Wagner	Wagner	Wagner	6	R & V Knight R	
Saxon.....	5	1785	112	32x44	.....	3x5 1/2	Own	4	18.23	1-Strum.	4.75	Own	Own	Own	Own	Own	Stewart	Firestone	6	80	Prent.	Delco	Delco	Delco	6	Saxon
Sayers Six.....	5	2095	118	33x44	Goodyear	3x4 1/2	Own	6	25.35	1-Strum.	4.50	B. and B.	G-L	Arvac	Stan-Par.	Warner	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Sayers Six	
Scripps-Booth B-39.....	5	1425	115	32x44	Goodyear	2 1/2 x 4 1/2	North.	6	18.99	1-Mar.	4.50	North.	Warner	Peters	West-Mott	Jacox	Stewart	Firestone	6	85	Prent.	Remy	Remy	Remy	6	Scripps-Booth B-39	
Seneca L.....	5	1185	108	30x34	Miller	3x4 1/2	Le Roi	4	15.63	1-Schub.	4.45	B. and B.	Own	Arvac	Stan-Par.	Own	Stewart	Firestone	6	88	Prent.	A-C	A-C	Conn.	6	Seneca L	
Severin H.....	5	2400	122 1/2	32x44	Miller	3x5 1/2	Own	6	29.40	1-Strum.	4.50	B. and B.	Own	Peters	Salisbury	Lavine	Stewart	Firestone	6	110	Camp.	Wagner	Wagner	Wagner	6	Severin H	
S. G. V.....	7	5000	136	33x55	Firestone	4x6	Boch.	4	28.90	1-Strum.	4.75	B-L	Own	Mechanics	Timken	Jacox	Warner	Firestone	6	116	U. S. L.	A-L	A-L	West.	6	S. G. V.	
Shaw.....	7	5000	136	33x55	Firestone	4x6	Boch.	4	28.90	1-Strum.	4.75	B-L	Own	Mechanics	Timken	Jacox	Warner	Firestone	6	116	U. S. L.	A-L	A-L	West.	6	Shaw	
Singer 20.....	7	5000	138	33x55	Goodyear	2 1/2 x 5	Weld.	12	39.68	1-Strum.	3.77	Covert	Covert	Spicer	Timken	Ross	Stewart	Firestone	6	162	Willard	Phil.	Phil.	West.	6	Singer 20	
Skelton.....	5	1295	112	32x33	optional	3x5 1/2	Lycorning	4	19.60	1-Carter	4.25	B. and B.	Own	Universal	Peru	C. A. S.	Stewart	Firestone	6	85	Prent.	West.	West.	West.	6	Skelton	
Spacke S-20.....	2	345	90	28x33	U. S.	3x3.67	Own	2	9.80	1-Carter	5.09	Own	Own	Own	Own	Own	Stewart	Firestone	6	160	Willard	A-K	A-K	Opt.	6	Spacke S-20	
Standard 8-1.....	7	127	127	34x44	optional	3x5 1/2	Own	8	33.80	1-Zen.	4.45	B. and B.	G-L	Arvac	Timken	Gemmer	Stewart	Firestone	6	160	Willard	West.	West.	West.	6	Standard 8-1	
Stanwood.....	5	2050	118	33x44	Firestone	3x4 1/2	Own	6	25.35	1-Strum.	4.50	B. and B.	G-L	Peters	Stan-Par.	Own	Stewart	Firestone	6	65	Willard	West.	West.	A-K	6	Stanwood	
Stearns SKL 4.....	5	2450	125	34x44	Goodrich	3x5 1/2	Own	4	22.50	1-Schub.	4.50	Own	Own	Spicer	Own	Own	V. S. S. S.	Firestone	12	65	Willard	West.	West.	A-K	12	Stearns SKL 4	
Stearns 80.....	6	2400	122	33x44	Flak	3x4 1/2	R & V	6	25.35	1-Tillot.	4.75	B. and B.	Own	Mechanics	Stan-Par.	C. A. S.	Stewart	Firestone	6-8	116	U. S. L.	A-L	A-L	Conn.	6	Stearns 80	

Engines—Ruten, Rutenberg; Cont., Continental; Weid., Weidely; Northway, H. S. Herschell-Spillman; Lyco, Lycoming; D-Lyco, Dory-Lyco; H. S. Golden, Belknap & Swartz; T-McTector-McFarlan; #, Monson or Duesenberg; R. & V. Root & Van Dervoort. Carburetor—Strum, Strumberg; Zen, Zenith; Ray, Rayfield; John, Johnson; Mar, Marvel; Sund, Sundman; Slew, Slew; H. K., Holley-Kingston; Newc, Newcomb; Schob, Schobler; Tiltot, Tiltotson; Johns, Johnston. Fuel feed vacuum except where otherwise indicated. *Pressure. #Gravity. Generator and Motor—A-L, Auto-Lite; West, Westinghouse; #, Westinghouse or Auto-Lite; W-L, Ward-Leonard; Dyn., Dyneto; N. E., North East; L-N, Leese-Neille; A-C, Allis-Chalmers; Split, Splitdorf; S-H, Simms-Huff; G. & D., Gray & Davis. Ignition—A-K, Atwater-Kent; Conn., Connecticut; Eise, Eisenmann; West, Westinghouse; Will, Willard; N. E., North East; K-Remy, Kingston-Remy; Berl, Berling; Boech-W., Boech-Westinghouse; Split, Splitdorf. Gearset—G-L, Grant-Less; North, Northway; B-L, Brown-Lipe. Rear Axle—Col. Columbia; W-Weiss Walker-Weiss; C-Timk, Cadillac-Timken; West-Mott, West-Mott; Cadillac-Timken; West-Mott, Cadillac-Timken; West-Mott, Cadillac-Timken; West-Mott, Cadillac-Timken. Speedometer—J-Man, Johns-Manville; V-Sicklen, Van Sicklen; A-C, Allis-Chalmers.

THE FARCE OF SERVICE

(Concluded from page 9)

wanting the valves ground, the oil drained, the car greased, and one thing or other. All of this he expects to pay for, but he wants the work done right. Yet how can he trust his car in a shop where the work during the run of the guarantee has been so unsatisfactory?

In the motor car business as in every other line of trade one universal truth holds good: The buyer doesn't stand much of a chance in the case of a complaint when once the article is bought and paid for. When the settlement is still "forthcoming", however, the attitude of the seller is in marked contrast. In a sense he is still selling the article; and all salesmen are agreeable before the transaction reaches its final consummation. But the car dealer is a greater offender in this respect than his contemporaries, as for example in the department store business, because to him in his particular territory the reputation of the manufacturer is intrusted. What is more, his running true to form results in crippling his repair end of the business; likewise his profits.

What the Insurance Man Knows

The first thing an automobile loss adjuster does when looking after an insurance company's cases in a new locality is to get a line on the repair men. If possible he lists a few whose reputation for prompt, accurate and reasonable work is a matter of common knowledge among local motorists. To such independent repair firms the adjuster sends the company's work. Reversing this statement, we might say that his first move is to eliminate the dealers' service stations. Why should he do this? Are the dealers not able to handle the volume of work? Are parts for the particular car not handy? Do they not have facilities for taking care of their own cars? Are their mechanics not thoroughly familiar with the particular make?

There is one outstanding reason for the adjuster's decision to let the independents handle the work, and that is because both the insurance companies and the policy holders know the dealer too well. If the owner of a car has no preference of repair shops, he will often warn the adjuster against having the service station attend to the work, and he will cite as his reason one of those million or so stories which motorists tell about their treatment at the hands of the dealer.

Doubtlessly the dealer has a lot to say on this subject, and can cite many an instance wherein car owners have been unreasonable; but when it has become almost the rule for car owners to break away from the service station as soon as possible after buying a car it would seem that something is radically wrong with the dealer's methods. It is with a view to helping him correct them that this question has been aired.

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. H. P.	Carburetor Size and Make	Gear Ratio	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Vols	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Stevens-Duryea	7	7000	138	35x5	optional	4 1/2x5 1/2	Own	6	47.25	—Strom.	.....	Own	Own	Own	Own	Own	Waltham	Firestone	6	.....	.....	West.	West.	Bertl.	6	Stevens-Duryea
Studebaker E-J	5	1485	112	32x4	.....	3 1/2x5 1/2	Own	6	22.44	—Strom.	4.55	Own	Own	Own	Own	Own	Stewart	Keley	6	80	Willard	Wagner	Wagner	Remy	6	Studebaker E-J
Studebaker E-G	7	2250	126	33x4 1/2	Goodyear	3 1/2x5	Own	6	36.04 1/2	Ball.	3.70	Own	Own	Spicer	Own	Own	V. Sicken	Keley	6	80	Willard	Wagner	Wagner	Delco	6	Studebaker E-G
Studebaker E-H	5	1785	119	32x4	.....	3 1/2x5	Own	4	29.40 1/2	—Strom.	4.33	Own	Own	Spicer	Own	Own	V. Sicken	Keley	6	130	Willard	Remy	Remy	.....	6	Studebaker E-H
Stuts H	6	3600	130	32x4 1/2	optional	4 1/2x5	Own	4	30.63 1/2	—Strom.	3.50	Own	Own	Own	Own	Own	Warner	.....	6	100	Presl.	Bijur	Bijur	Simms	6	Stuts H
Templar A-445	5	2885	118	32x4	optional	3 1/2x5	Own	4	18.23 1/2	—Strom.*	4.40	B. and B.	Detroit	Hardy	Own	Own	Warner	Firestone	6	80	Exide	Bijur	Bijur	Conn.	6	Templar A-445
Texan B-38	5	1495	115	32x4	Southland	5 3/8	Lyc.	4	19.50	—Car.	4.50	B. and B.	G-L	Detroit	Peru	Own	Stewart	Stanwell	6	80	Exide	Bijur	Bijur	Conn.	6	Texan B-38
Texas E	5	1885	115	32x4	Goodyear	3 1/2x4 1/2	H-S	4	19.60 1/2	—Zen.	4.66	B. and B.	Durston	Arvae	Timken	Own	V. Sicken	Firestone	6	100	Willard	Dyn.	Dyn.	Conn.	6	Texas E
Velle 48	5	1585	112	32x3 1/2	optional	3 1/2x4 1/2	Falls	6	25.35 1/2	—Ray.	4.60	B. and B.	Warner	Arvae	Col.	Own	V. Sicken	Firestone	6	108	Willard	Bijur	Bijur	A-K	6	Velle 48
Velle 34	5	2285	124	32x4	Goodrich	3 1/2x5	H-S	6	25.35	—Schob.	4.50	B. and B.	Warner	Arvae	Col.	Own	V. Sicken	Firestone	6	108	Willard	A-L	A-L	Conn.	6	Velle 34
Vogue 6-55	5	2485	124	33x4 1/2	Goodrich	3 1/2x5 1/2	Cont.	6	29.40	—Schob.	4.50	B. and B.	Warner	Arvae	Col.	Own	V. Sicken	Firestone	6	145	Exide	West.	West.	Boesh	6	Vogue 6-55
Vogue 6-46	4	2485	124	33x4 1/2	Goodrich	3 1/2x5 1/2	Cont.	6	36.10 1/2	—Strom.	3.10	.....	Covert	Arvae	Col.	Own	V. Sicken	Firestone	6	117	Willard	Delco	Delco	Delco	6	Vogue 6-46
Wasp	4	6500	132	33x5	Firestone	4 1/2x5 1/2	Wia.	6	25.35 1/2	—Ray.	5.09	B. and B.	Warner	Arvae	Col.	Own	V. Sicken	Firestone	6	117	Willard	Delco	Delco	Delco	6	Wasp
Westcott C-38	5	2690	118	33x4	Firestone	3 1/2x4 1/2	Cont.	6	29.40 1/2	—Ray.	4.45	B. and B.	Warner	Arvae	Col.	Own	V. Sicken	Firestone	6	170	U. S. L.	A-L	A-L	Conn.	6	Westcott C-38
Westcott C-48	7	3190	125	32x4 1/2	Firestone	3 1/2x5 1/2	Cont.	6	21.03	1—Tillot.*	5.00	Own	Ther-H.	Peters	Timken	Own	V. Sicken	Firestone	6	127	Willard	Delco	Delco	Delco	6	Westcott C-48
Willys-Knight 20	5	2250	118	33x4	Fisk	3 1/2x4 1/2	Own	4	21.03	1—Tillot.*	5.00	Own	Ther-H.	Peters	Timken	Own	V. Sicken	Firestone	6	120	Willard	West.	West.	West.	6	Willys-Knight 20
Winton 61	5	120	33x4	Goodyear	3 1/2x5	3 1/2x5 1/2	H-S	6	25.35 1/2	—Strom.	4.50	Warner	Warner	Peters	Specke	Own	Stewart	Stanwell	6	120	Willard	Bijur	Bijur	Boesh	6	Winton 61
Winton 25	7	4500	132	35x5	optional	3 1/2x5 1/2	Own	6	33.75 1/2	—Strom.	4.90	.....	Warner	Peters	Specke	Own	Stewart	Firestone	6	120	Willard	Bijur	Bijur	Boesh	6	Winton 25

STEAM CARS

[illegible]

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Des Moines, Ia.	Annual Fall Show	Aug. 25-Sept. 6
Toronto, Exhibition City	National Automobile Show	Aug. 28-Sept. 11
Milwaukee	Annual Fall Automobile Show	Aug. 30-Sept. 4
Indianapolis	Fall Automobile Show	Sept. 6-11
Buffalo	Closed Car Show	Sept. 27-Oct. 2
Northampton, Mass.	Annual Automobile Show	Oct. 6-8
Jersey City, N. J.	Annual Automobile Show	Nov. 1-6
New York	Automobile Salon	Nov. 14-21
Chicago	Automotive Equipment Show	Nov. 15-20
New York	National Passenger Car Show	Jan. 8-15, 1921
Chicago	National Passenger Car Show	Jan. 20-Feb. 4, 1921

TRACTOR SHOWS

Holdrege, Neb.	Third Annual Tractor Demonstration	Aug. 5-7
Los Angeles, Cal.	National Tractor and Implement Show of the West	Sept. 20-26
Columbus, O.	National Tractor Show	Feb. 6-12, 1921

FOREIGN SHOWS

London	Commercial Vehicles, Exhibition, Olympia	October
London	Passenger Car Show, Olympia	November

RACES

Paris, France	Grand Prix Race, Sporting Commission	August
Erie, Pa.	Dirt Track	Aug. 7
Buffalo, N. Y.	Dirt Track	Aug. 14
Elgin, Ill.	Road Race	Aug. 21
Johnstown City, Pa.	Dirt Track	Aug. 21
Middletown, N. Y.	Dirt Track	Aug. 20-21
Flemington, N. J.	Dirt Track	Aug. 27-28
Canandigua, N. Y.	Dirt Track	Aug. 28
Hornell, N. Y.	Dirt Track	Sept. 6
Uniontown, Pa.	Speedway Race	Sept. 6
Syracuse, N. Y.	Dirt Track	Sept. 17-18
Allentown, Pa.	Dirt Track	Sept. 25

TOURS

Milwaukee, Wis.	Annual Fall Automobile Show	Aug. 30-Sept. 4
Detroit	Good Roads Assn. Tour	July 14-20

CONVENTIONS

Cincinnati	Ohio Automobile Trade Assn. Fourth Annual Convention	Dec. 8-10
Atlantic City	National Implement and Vehicle Ass'n, Twenty-seventh Annual Convention	Oct. 20, 21, 22

The first aeroplane advertisement in Fort Wayne, Ind., made its appearance this week when the Pennell Automobile Co., the only authorized Ford dealers in the territory, directed attention through the newspapers to the recently completed Pennell Aviation Field and urged the readers to "make your first aeroplane flight tomorrow."

The State Highway Department has issued a statement that it has no authority under the automobile law to revoke the license of any person convicted of the theft of an automobile.

Motion pictures were introduced in court and made a part of the record in a lawsuit brought before Judge Albert B. Anderson of the United States Federal Court at Indianapolis by Robert H. Hassler, Inc., against the Van Briggie Motor Device Co., both manufacturers of shock absorbers, for infringement of patent. The pictures showed the rear axle of an automobile and a rear spring on the ends of which the two absorbers were mounted.

The airplane drummer has made his first appearance in Cincinnati. C. C. Shively, traveling salesman for a Piqua, Ohio, underwear concern, flew to Cincinnati this week with his samples, sold a bill of goods and flew back.

Ontario, Canada, is spending \$5,000,000 on good roads this year and the Department of Public Works is preparing a plan that will call for an expenditure of \$185,000,000 for the construction of 2000 miles of provincial highways within five years.

Eight thousand new automobile touring signs are being placed on the highways of northern California by the California State Automobile Association, pointing the way and giving the distance to the cities and towns in each direction.

If other cities in the state follow the example of Alexandria persons making automobile tours

through Louisiana will have to take out a license in every town through which they pass. The city council recently adopted an ordinance requiring every automotive vehicle using the streets of the city to carry a city license. Other municipalities in the vicinity are considering passing a similar ordinance.

The Kalamazoo Spring Co., Detroit, headed by Christian Girl, formerly of Standard Parts Co., will change its name to the C. G. Spring Co., Incorporated, in Delaware. Details of the financing are now under way and permission is being sought from the Michigan Securities Commission to dispose of the stock of the company in Michigan.

Fred Crebbin, Jr., formerly factory manager of the Master Trucks, Inc., has assumed his duties as general manager of the truck division of the Stoughton Wagon Co., of Stoughton, Wis. Mr. Stoughton served with the Packard Motor Car Co. in Detroit for a number of years and in 1908 left Packard and took a place with the Thomas Motor Car Co., of New York. Later he was general sales manager of the S-G-V Co. He was with the Hulbert Motor Truck Co. in New York for seven years before going to Chicago as factory manager of the Master Trucks Company.

The Fontaine-Lipman Automobile Co., Milwaukee, has been organized to act as Wisconsin distributor of the Stutz. A sales and service station will be opened Sept. 1 at Prospect and North avenues. The proprietors are Carl C. Lipman and Louis Fontaine, for several years mechanic for Ralph De Palma.

The Cyclone Starter & Truck Co., capitalized at \$1,000,000 to manufacture a patent starter for use on trucks together with a 1-ton truck, has started work on the construction of a plant at Greenville, S. C. Pending the completion of

these works, the starters are being manufactured at Dayton, Ohio.

Roy D. Chapin, president of the Hudson Motor Car Co., has been named on the Committee of Highways of the Chamber of Commerce of the United States.

The Liberty Vulcanizer Mfg. Co., Milwaukee, manufacturer of tire repair devices and equipment, has purchased a site at Twenty-eighth and National avenues and will build at once a two-story factory, 40x100 ft., which will provide greatly increased capacity.

J. T. Fields, sales manager of the Liberty Motor Car Co., has been promoted to the post of assistant to President Percy Owen. Mr. Fields is succeeded as sales manager by R. M. McCormick, formerly eastern district manager for Liberty.

Harry H. Holm, president of the Badger Auto Radiator Co., Milwaukee, has organized the Holm Radiator Corp., with a capital stock of \$50,000, to manufacture, deal in and repair radiators and other automotive equipment and parts.

B. F. Wright has resigned as chief engineer of the Federal Motor Truck Co. to associate himself with the Republic organization at Alma, Mich., in a similar capacity, succeeding Major William Britton, who has joined the company being organized by F. W. Ruggles, former Republic president. Work on the truck to be built by the Ruggles concern at Saginaw has been in progress about a year.

Alfred K. Hebner, who will continue as general manager of the Bearings Service Co., Detroit, has been elected president of the company to succeed Ralph S. Lane, who has resigned but who will continue on the directorate, as will Harry J. Porter, who has resigned as treasurer and secretary, to give way to Dana H. Torrey, former sales manager. The new sales manager is W. J. St. Onge, previously with the Wire Wheel Corp.

The Keystone State Motor and Body Co., Philadelphia, has been appointed distributor for the York Body Co., of York, Pa., handling a complete line of bodies for Chevrolets, Fords, Maxwells, and Dodges. The company has the territory for Eastern Pennsylvania, Delaware, New Jersey and the eastern shore of Maryland.

The Magnetic Motors Corp., 430 Jefferson street, Milwaukee, Wis., distributor of the Stevens-Duryea and the Baker-R & L electric in Wisconsin, has been appointed distributor of the Case in southern Wisconsin. The Case, made in Racine, Wis., has had no direct representation in Milwaukee and vicinity for a year or longer.

E. W. Patterson, service manager of the Stenerson Motors Corp., Philadelphia, which is merchandising Westcott passenger cars, and who formerly was service manager for the Fulton Truck Co., Philadelphia, will, aside from his present duties, assume the agency personally for the Fulton truck in this city, for the reorganized Fulton Co. of America.

Fred Koester, of Milwaukee, has become associated with the Olson-Pauly Automobile Co., 239 Wisconsin street, Milwaukee, distributor of the Holmes and Grant in Wisconsin. Mr. Koester will handle the wholesale department of the Grant division.

A 24-hour service station, the first to be established in the downtown business district of Milwaukee, Wis., will be opened for business under the name of The Loop Service Station, about the middle of September.

K. P. Drysdale, widely known in the advertising field, has joined the Brooke, Smith & French organization in Detroit as special advertising and merchandising counsel. Mr. Drysdale will pay special attention to the account of the Lincoln Motor Co. He was for many years associated with the Cadillac organization as assistant sales manager and advertising manager.

The Philadelphia Used Car Dealers' Association, whose formation recently was announced, co-operating with the Automobile Salesmen's Association, Better Business Bureau, Philadelphia Sabbath Association and other organizations, has formally decided to have members' place of business continue closed all day Sunday.